USAF Historical Studies: No. 176

RUSSIAN REACTIONS TO GERMAN AIRPOWER IN WORLD WAR II

by

Generalleutnant a. D. Klaus Uebe

USAF HISTORICAL DIVISION
Aerospace Studies Institute
Air University
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Field Marshal Albert Kesselring in staff conference with his Second Air Fleet in Minsk, Russia, 1941. At the situation map Lieutenant Colonel Klaus Uebe. Behind them (left to right) Colonel Ewers (Adjutant) and Colonel (GSC) Hans Seidemann.

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FOREWORD

Russian Reactions to German Airpower in World War II, written by Generalleutnant a. D. Klaus Uebe, and revised and edited by Mr. Harry Fletcher, is one of a series of historical studies written for the United States Air Force Historical Division by men who had been key officers in the German Air Force during World War II.

The overall purpose of the series is twofold: 1) To provide the United States Air Force with a comprehensive and, insofar as possible, authoritative history of a major air force which suffered defeat in World War II, a history prepared by many of the principal and responsible leaders of that air force; 2) to provide a firsthand account of that air force's unique combat in a major war, especially its fight against the forces of the Soviet Union. This series of studies therefore covers in large part virtually all phases of the Luftwaffe's operations and organization, from its camouflaged origin in the Reichswehr, during the period of secret German rearmament following World War I, through its participation in the Spanish Civil War and its massive operations and final defeat in World War II, with particular attention to the air war on the Eastern Front.

The German Air Force Historical Project (referred to hereinafter by its shorter and current title, "The GAF Monograph Project") has generated this and other especially prepared volumes which comprise, in one form or another, a total of more than 40 separate studies. The project, which was conceived and developed by the USAF Historical Division, was, upon recommendation of Headquarters Air University late in 1952, approved and funded by Headquarters USAF in early 1953. General supervision was assigned to the USAF Historical Division by Headquarters USAF, which continued principal funding of the project through 30 June 1958. Within the Historical Division, Dr. Albert F. Simpson and Mr. Joseph W. Angell, Jr., respectively Chief and Assistant Chief of the Division, exercised overall supervision of the project. The first steps towards its initiation were taken in the fall of 1952 following a staff visit by Mr. Angell to the Historical Division, Headquarters United States Army, Europe, at Karlsruhe, Germany, where the Army was conducting a somewhat similar historical project covering matters and operations almost wholly of interest to that service. Whereas the Army's project had produced or was

producing a multiplicity of studies of varying length and significance (more than 2,000 have been prepared to date by the Army project), it was early decided that the Air Force should request a radically smaller number (around 40) which should be very carefully planned initially and rather closely integrated. Thirteen narrative histories of GAF combat operations, by theater areas, and 27 monographic studies dealing with areas of particular interest to the United States Air Force were recommended to, and approved by, Headquarters USAF in the initial project proposal of late 1952. (A list of histories and studies appears at the end of this volume.)

By early 1953 the actual work of preparing the studies was begun. Col. Wendell A. Hammer, USAF, was assigned as Project Officer, with duty station at the USAREUR Historical Division in Karlsruhe. General der Flieger a. D. Paul Deichmann was appointed and served continuously as Control Officer for the research and writing phases of the project; he also had duty station at the USAREUR Historical Division. Generalleutnant a. D. Hermann Plocher served as Assistant Control Officer until his recall to duty with the new German Air Force in the spring of 1957. These two widely experienced and high-ranking officers of the former Luftwaffe secured as principal authors, or "topic leaders," former officers of the Luftwaffe, each of whom, by virtue of his experience in World War II, was especially qualified to write on one of the topics approved for study. These "topic leaders" were, in turn, assisted by "home workers"--for the most part former general and field-grade officers with either specialized operational or technical experience. The contributions of each of these "home workers," then, form the basic material of most of these studies. In writing his narrative the "topic leader" has put these contributions into their proper perspective.

These studies find their principal authority in the personal knowledge and experience of their authors. In preparing the studies, however, the authors have not depended on their memories alone, for their personal knowledge has been augmented by a collection of Luftwaffe documents which has come to be known as the Karlsruhe Document Collection and which is now housed in the Archives Branch of the USAF Historical Division. This collection consists of directives, situation reports, war diaries, personal diaries, strength reports, minutes of meetings, aerial photographs, and various other materials derived, chiefly, from three sources: the Captured German Documents Section of The Adjutant General in Alexandria, Virginia; the Air Ministry in London; and private German collections made available to the project by its participating authors and contributors. In

addition, the collection includes the contributions of the "home workers." The authors have also made use of such materials as the records of the Nuremberg Trials, the manuscripts prepared by the Foreign Military Studies Branch of the USAREUR Historical Division, the official military histories of the United States and the United Kingdom, and the wealth of literature concerning World War II, both in German and English, which has appeared in book form or in military journals since 1945.

With the completion of the research and writing phases in 1958, the operations at Karlsruhe were closed out. At that time the project was moved to the Air University, Maxwell Air Force Base, Alabama, where the process of editing and publishing the studies was begun by the USAF Historical Division.

Basic revising and editing of the monographs has been handled by Mr. Edwin P. Kennedy (1958-61), Dr. Littleton B. Atkinson (1961-62), Mr. Gerard E. Hasselwander (1962-63), and the present Editor, Mr. Harry R. Fletcher. Final review and editing has been the responsibility of Dr. Albert F. Simpson, Chief, USAF Historical Division, with the assistance of Dr. Maurer Maurer, Chief of the Division's Historical Studies Branch.

The complexity of the GAF Monograph Project and the variety of participation which it has required can easily be deduced from the acknowledgments which follow. On the German side: General Deichmann, who, as Chief Control Officer, became the moving force behind the entire project, and his assistant, General Plocher; General Josef Kammhuber, a contributor to, and strong supporter of, the project, who became the first chief of the new German Air Force; Generaloberst a. D. Franz Halder, Chief of the German Army General Staff from 1938 to 1942, whose sympathetic assistance to the project was of the greatest value; the late Generalfeldmarschall Albert Kesselring, who contributed to several of the studies and who also, because of his prestige and popularity in German military circles, was able to encourage many others to contribute to the project; and all of the German "topic leaders" and "home workers" who are too numerous to mention here, but whose names can be found in the prefaces and footnotes to the individual studies.

In Germany, Colonel Hammer served as Project Officer from early in 1953 until June 1957. Colonel Hammer's considerable diplomatic and administrative skills helped greatly towards assuring

the project's success. Col. William S. Nye, USAF, was Chief of the USAREUR Historical Division at the project's inception; his strong support provided an enviable example of interservice co-operation and set the pattern which his several successors followed. In England, Mr. L. A. Jackets, Head of Air Historical Branch, British Air Ministry, gave invaluable assistance with captured Luftwaffe documents.

The project is indebted to all of those members of the USAREUR Historical Division, the Office of the Chief of Military History, and the USAF Historical Division, whose assistance and advice helped the project to achieve its goals.

At the Air University, a number of people, both military and civilian, have given strong and expert support to the project. The several Commanders of Air University during the life of the project in Karlsruhe (1952-1958) without exception were interested in the project and gave it their full backing. Other personnel at Headquarters Air University who contributed time and experience include: the several Directors of the Aerospace Studies Institute since 1952; Dr. James C. Shelburne, Educational Advisor to the Commander; Mr. J. S. Vann, Chief of Special Projects Branch, DCS/Operations; and Mr. Arthur P. Irwin, Chief, Budget Division, DCS/Comptroller.

The project is grateful to Lt. Col. Leonard C. Hoffman, former Assistant Air Attaché to Germany, who gave indispensable aid during the project's last year in Germany, and to Mr. Joseph P. Tustin, Chief Historian of Headquarters, United States Air Forces in Europe during the years when the project was at Karlsruhe, who rendered substantial assistance by solving a variety of logistical and administrative problems.

Mrs. Mary F. Hanlin deserves special thanks for her expert typing of the final draft.

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PREFACE

This is one of a series of studies which deal with the German Air Force's war against the Soviet Union from 1941 to 1945. The study was compiled by Generalleutnant Klaus Uebe from verbatim accounts of German Air Force officers who saw extensive service on the Eastern Front, as well as from official and semi-official diaries, directives, and commentaries.

This study, in its present form, is not intended to be a definitive work, nor have attempts been made to enumerate each example of the Soviet responses to airpower. The reader should also bear in mind that this study reflects whatever prejudices or shortcomings might be found in the original German accounts.

The Uebe manuscript has undergone extensive editing by the USAF Historical Division. Some portions have been abridged and in other places additions made to improve the narrative for the USAF reader. Most of the long quotations have been sharply reduced, while certain organizational changes have been made to enhance the clarity of the study and to facilitate its use. Every effort has been made, however, to preserve the essence of General Uebe's commentary as well as the meaning and significance of the original German reports.

Russian reactions to airpower have become a topic of increasing interest to the USAF, and the best source for information on those characteristics is still to be found in a study of the Russo-German conflict during World War II. Although time and technological advances may have reduced the validity of some of these experiences, the geography of the Soviet Union remains the same, and many of the human aspects of reaction may be expected to be fundamentally unchanged. The responses noted in this study are therefore still worthy of attention by the military student.

ABOUT THE AUTHOR

Generalleutnant (Ret) Klaus Uebe was born on 1 May 1900 and began his military life at Paderborn, where he enlisted on 1 February 1923 in the 18th (Prussian) Infantry Regiment. He thus represents one of the outstanding younger German officers, whose service career began under the Reichswehr or the German Republic rather than in the old Imperial Army.

Uebe was commissioned a lieutenant in the 18th Infantry Regiment on 1 December 1926, and within three years became regimental Adjutant. On 31 May 1931 he transferred to the German Air Force, which was then being secretly activated under the watchful protection of the Defense Ministry, and received his initial training as a pilot and observer. In 1932 he was appointed Adjutant of Group "N" at the German Aviation School. With his promotion to captain in 1934, he became Adjutant of the famous Fighter Wing "Boelcke," and the following year he was assigned to the German Air Force Academy at Berlin-Gatow.

When World War II erupted, Uebe was already a General Staff Officer of the German Air Force, serving as Operations Officer to the Chief of German Air Defense. Upon his promotion to major in 1940, he was given command of the 2d Squadron of the Third Fighter Group, then operating against Britain. He was transferred prior to 22 June 1941 to the Russian theater of operations and posted at Command Headquarters of the Second Air Fleet, then in support of Field Marshal Fedor von Bock's Army Group Center. Later in the year Uebe also performed duty as a Staff Officer with the Commander-in-Chief South, for the African campaign.

In 1942 he returned to the Eastern Front and became Chief of Staff of the VIII Air Corps, operating in the central and southern sectors of the front, particularly in the Crimean area. He was advanced in 1943 to the position of Chief of Staff of Air Force Headquarters Don, where he served during an especially critical period when the Luftwaffe was defending the withdrawing German Army. Upon his promotion to General on 1 January 1944, Uebe became Chief of Staff of the First Air Fleet in the northern theater of operations. In December he was assigned to the Command Headquarters of the Air Force High Command (OKL).

General Uebe's final two assignments were largely administrative in nature, beginning with his duty as Commanding General

of the Fourth Air Division in January of 1945, and culminating with the position of Commanding General of the Air Force Command East Prussia in April. From May to August of 1945, Uebe served ably as Chief of Demobilization in North Germany.

Because of his broad and lengthy personal experience, General Uebe is eminently qualified to add his voice to those of his colleagues in describing some of the Russian reactions to the application of German airpower.

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Chapter 1

SOME FACTORS INFLUENCING RUSSIAN REACTIONS TO GERMAN AIRPOWER

Among the many questions which beset German Air Force commanders when Russia was invaded on 22 June 1941, and throughout the war, none was more important than that of possible Russian reactions to the application of German airpower. Luftwaffe operations during the war in the East were decisively influenced by the inherent nature and disposition of the Russian soldier, his formal and military education (or lack of it), his equipment, and his combat tactics, many of which were derived from actual experience in specific areas.

The Russian Soldier and His Training

In the eyes of the German commanders, their Russian opponents appeared to be a mentally lethargic lot, inclined toward stolid insensibility, sometimes contrary, while at other times taciturn and crafty. The Russians, often so communicative and trusting, had a strong latent tendency toward excessive ambition and extreme ruthlessness. A German Army leader, speaking of the Russian soldier, declared, "His emotions run the gamut from animal ferocity to the utmost kindliness; odious and cruel in a group, he can be friendly and ready to help as an individual."[1] These peculiarities stem from the inherent character of the Russian people, a character differing considerably from that of Western people. General der Infanterie Guenther Blumentritt* ascribes these traits of character to an "Eastern-oriented mentality," closely resembling the mentality of other Eastern Europeans.[2] A relatively lower value on human life seemed to be another characteristic of the Russians, and could be observed in the air dropping of Soviet partisans and troops behind the German lines during the winter when these men were often dropped, without parachutes, in wooden crates or in straw-filled sacks in which they were obliged to endure not only the severe shocks of landing but the harshness of exposure as well.[3] Russian soldiers were not surprised by such unorthodox measures, but stoically accepted them as matters of course.

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* Editor's Note: General Blumentritt served in Russia with Army Group Don, although he is best known as a senior staff officer and General in the West.

The Russian soldier's historically close ties to the soil tended to strengthen the bonds which linked him to his family and homeland, and made him feel infinitely more secure on the ground than upon the sea or in the air. German airmen observed this characteristic in the marked Russian aversion for aerial and maritime activities. This close affinity with nature, however, gave Russians a great capacity for learning and understanding the arts of camouflage and deception.[4] Conversely, their rather primitive traits of character generally caused them to shun the use of devices which were complicated or technologically advanced. While this resulted in some serious deficiencies in the mechanical field and in a marked reluctance to rely upon complex instruments and equipment, it encouraged them to develop unorthodox technical improvisations by which they often astonished their enemies.

Composed of diverse elements, most of which were of rude peasant background, the Russian armed forces were uniquely prepared to adjust to a variety of primitive surroundings and adverse conditions, including cold, hunger, and thirst.* This gave them great tenacity in defense. The gregarious nature of the Russian soldier encouraged him to make the best of bad situations and to prefer group undertakings rather than individual action. His almost legendary obedience to authority, his great ability to adjust, and his willingness to work in almost unbearable conditions, assisted him in overcoming obstacles which had been considered insurmountable by German officers. German military leaders soon learned that a piece of ground which was impassable by their own standards might not be impassable by Soviet standards.[5]

When winter halted Germany's 1941 operations in the East, Luftwaffe and German Army leaders alike were surprised and concerned to note that the Russian Army had not dug in to prepare for a static winter defense. Instead, the Russians endured the bitter 40° below zero temperatures in order to attack when the Wehrmacht was least able to counter them. Nevertheless, German commanders noted that enemy soldiers were not "immune to the terrors of a battle of attrition with its combination of massed fire, bombs, and flame throwers." When the Russian soldier was caught unawares by such a force he often fled in great disorder.[6]

Scientists and construction engineers stood out as a superior social and intellectual element in Russian society, but one which often lacked the decisive gift of intuition. Nevertheless, they adopted

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* See photograph No. 2, p. 7a.

foreign ideas which were deemed to be of value, and ingeniously tailored them to Russian requirements.

The factors and attributes mentioned above helped to engender in the Russian people a sense of inferiority in their relations with peoples of the West, for which they frequently tried to compensate by an exaggerated display of self-assurance and, even, conceit. The marked Russian thoroughness in planning and the inclination to imitate the successes of foreigners were but two aspects of the central problem of psychological inferiority. Russian commanders thus supervised all political and military functions with excessive scrutiny. This sense of inferiority also exerted a detrimental effect upon their ability to react wisely to unexpected events. The Russian soldier masked these weaknesses with a veneer of incredible stoicism and a supreme fatalism, which enabled him to withstand the fortunes of war, including assaults from the air, better than was generally true of Germany's opponents in the West.[7]

Apart from the general characteristics just described, the military qualities of the Russian soldier and his subsequent behavior during World War II were products of intellectually standardized trends in education. Grievous losses of qualified manpower suffered by the Soviet Union in 1941 brought the level of Russian military education and training to a low ebb. Time shortages and the continuously critical situation at the front tended to reduce these levels still further. The inadequacies in training were basically the cause for the very general fear of German airpower by Russian military personnel, which among airmen frequently bordered upon cowardice.

Russian soldiers were taught to take appropriate action in the fields of cover, concealment, and deception. Infantrymen were especially well trained in this respect and were able to adapt themselves to, and master, every type of terrain, using whatever simple means were available. With the exception of the officer corps, soldiers of armored units were generally better trained in driver education than in the use of camouflage, although even their driving courses left much to be desired. Conditions were very much the same in the artillery where principal stress was laid upon the mastery of various weapons and in firing for speed and accuracy. Although the subject of terrain appreciation was largely neglected among artillery units, their execution of orders was good. In the area of command flexibility, however, they remained basically unsatisfactory.

Flying training in the Russian Air Force permitted Soviet flyers to gain only a rough mastery of their aircraft. Training standards in aerial firing were likewise deficient. A shortage of the best modern aircraft and poor performance of the existing types of operational aircraft hampered flight training, while shortages of fuel served to aggravate the problem still further. Aware of their shortcomings in the field of aviation, the Russians placed great emphasis upon instruction in formation flying, but this was done most effectively in organizations equipped with planes such as the IL-2/3 "Stormovik," a heavily armored, highly maneuverable, but comparatively slow aircraft used for ground-attack missions.[8] German commanders assumed from the outset that the Soviet Union would neglect other areas of flying training in their zeal to teach formation flying, a suspicion which subsequently proved to be correct.[9] Bomber and observation personnel were well trained, but reconnaissance flyers, for some reason, received very little training. Perhaps the primary mission of supporting the army and navy in their combat operations determined the amount of emphasis to be placed upon each facet of flying training. Russian aviators disliked high altitude training and flights involving the use of oxygen masks, an antipathy which endured until the end of the war.

In order to increase the number of men trained for aviation duty, the Soviet government sponsored, even before the war, Aero clubs which served as auxiliary training organizations. By 1940 these clubs had taught the rudiments of flying to nearly 100,000 Russians, thus materially assisting in building the pool of reserves which was to help the Soviet Union to offset the heavy losses of flying personnel who fell in the campaigns of 1941.[10]

Flying training gradually improved as the war progressed, so that by 1945 most Soviet aviators could handle their aircraft in bad weather as well as in good. Personnel shortages remained a rather serious issue, however, in many parts of the Russian Air Force until the end of the war.

Navigational training was seriously deficient. Pilots were taught to orient themselves mainly by reference to terrain features, and only the most outstanding pilots were able to fly by map and compass. This was true despite the fact that Russian airmen received preferential treatment over servicemen from other branches of the armed forces, even while in the training cycle.* Better

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* See photograph No. 3, p. 7a.

rations, more modern personal equipment, and special communist political training were all elements of the flyers' training and were designed to build a solid esprit de corps in the Air Force, based upon a firm indoctrination in Soviet theories and policies. The Russian Air Force, like all other branches of the Soviet armed forces, found itself obliged to order improperly or inadequately trained men into combat to stem the tide of the German war machine, and thus lost most of its ready reserves in the early phases of the war.[11]

Disciplinary training was exaggerated in the Russian armed forces. Blind obedience was expected in most military situations. Methods of training were therefore largely mechanical in application, and instructors tended to adhere too closely to the letter of regulations, chiefly out of fear of punishment for any deviation. These instructors generally lacked both experience and personal initiative, defects which could be partially traced to weaknesses within the Soviet system of government, a system which appreciably restricted the scope of activities among its lower command echelons and the rank and file. With the exception of the armored and elite (guards) units and, to a certain extent, the Air Force, the relative merit of the lower commands showed a steady qualitative decline throughout the war.

The appeal to patriotism was the very cornerstone of Soviet training and indoctrination. Russian soldiers were thus taught to have "a great love for their country and a solemn hatred of its enemies." World War II was therefore dubbed "The Great Patriotic War." Soviet leaders were careful to identify Communism with the national cause, and they subsequently claimed that military training in the Soviet Union was superior to that of Western nations because it was firmly based upon a "leadership by Communist and Workers' Parties."[12]

Coordination of arms and services in operations was given a high priority in Soviet training programs. Nevertheless, only the more rudimentary and least hazardous combat methods were taught. Coordination and joint operations were seriously weak, even among air units, although Russian soldiers subsequently learned to execute orders to perfection, one aspect of field training in which they had been deficient in June of 1941.

Many other shortcomings in Russian training were remedied as the war progressed, but until the end of the conflict the potential of the Soviet armed forces was diminished by a program which lacked

the intensity and the purpose commonly found in European training plans. Training thus failed to keep pace with rapid, and sometimes decisive, developments in the wartime situation, particularly the Russian achievement of numerical superiority on the ground and in the air, and the constantly increasing availability of modern combat equipment.

In the psychological field, Germans ascribed the pronounced Russian hatred of the enemy and violence to a systematic Soviet government program which aimed to incite its troops against Germans. Translated into action, this hatred often resulted in the torture and murder of German troops and of German airmen who were forced to bail out or to make crash landings. Some German commanders reported that "the Russians apparently had sought to impress the German troops and lower their morale by committing numerous atrocities against them. The great number of such crimes, committed on all sectors of the front . . . tends to support that presumption."[13]

Although the Russian training cycle includes exercises in planning, preparations, and conduct of operations by large units, their training could not completely or permanently compensate for the deficiencies arising out of the Soviet system of political indoctrination. Reactions in combat, despite an increasing intensity in training as the war progressed, still fell below the accepted norms for speed and consistency of Western armies.

Soviet Equipment and Materiel

Russian armament was generally modern. Infantry weapons, although quite light in construction, were long in range and easily maintained under field conditions. Automatic weapons were used in great numbers; many of them were of very simple construction, a technique which the Soviets may have learned from the United States.

Being alive to the adverse conditions of climate and terrain, the Russians manufactured trucks, tanks, and other vehicles with good ground clearance which were also serviceable under the most rigorous combat situations. At the outset of war in 1941, the Soviet Union had a large number of very inferior armored vehicles, most of which were rapidly destroyed by the German Wehrmacht. Within 90 days, however, the new T-34 tank appeared on the field of battle, a tank which was to prove its worth many times over in the course of the war. Its merit was immediately recognized by

Soviet Russian flying officers captured by the German Air Force.

A Russian peasant dwelling.

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Effect of fragmentation bombs on
Soviet aircraft at the Lida Airfield.

Russian aircraft destroyed upon the
ground at Kaunas (Lithuania) 1941.

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German leaders, who attributed the great "tank scare" of the winter of 1941-42 to the widespread use of the T-34.[14]

Russian aircraft used in June of 1941 were then already obsolete. The loss of most of their front line planes during the first few months of fighting was largely a result of this obsolescence. As one German commander recalled, "At the beginning of the great German offensive in the East, the ground troops saw only flights of three or four reconnaissance planes, individual bomber squadrons, and only a few fighters. . . . They quickly became victims of German fighters."[15]* These massive losses might have proven disastrous except that the Soviet aircraft industry, wisely limiting its aircraft construction program to the models required for the defense and support of ground operations, succeeded in producing a large number of reliable, if not outstanding, aircraft. These planes were primarily fighters, ground-attack, and light bomber aircraft, all of which could be quickly constructed in mass.

As early as the autumn of 1941 the first IL-2 (Ilyushin) "Stormovik" ground-attack plane appeared at the front. This type, which soon became available in large numbers, was ideally suited, by virtue of its rugged construction and excellent armor protection, for air support missions. Frequently formations of Me-109s and even Fw-190s expended their entire allocations of ammunition firing at them without bringing them down. German antiaircraft commanders noted that the "Stormoviks" could be shot down by light and medium antiaircraft artillery only if direct hits were scored and soon began to make greater use of the heavy (8.8 cm) gun against Soviet aircraft. IL-2 planes were most vulnerable when fired upon from above or from the rear by explosive ammunition. The tail and control surfaces disintegrated readily if struck by gunfire. At ranges of 900 to 1,200 feet, light antiaircraft guns had little effect upon them, although successful hits were scored by medium or larger calibre guns which happened to strike the engines, tail assemblies, or control surfaces of these planes.† The "Stormovik" was somewhat sluggish in performance; it might have been more maneuverable except for its weak power unit.

Fighter planes produced by the Russians during the war were generally good and were rapidly improved. They were simple in

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* See photographs Nos. 4 and 5, p. 7b.

† See photograph No. 6, p. 9a.

construction and in operation and were consequently very well suited for the training of Russian flyers, who normally had little technical knowledge. The handling and climbing performances of these planes were excellent at lower altitudes, although a very sharp decrease in performance was noted above 20,000 feet. In horizontal flight Russian fighters were vastly inferior to their German counterparts until the last part of the war. After the autumn of 1944, fighters produced in the Soviet Union were equal in performance to the best planes in the German Air Force. The last fighter plane manufactured by the Russians during the war, the Yak-3, a fast single-engine fighter and ground-attack aircraft, was even superior to the Me-109.[16*] Few highly advanced types of aircraft, such as the Yak-3, actually appeared over the front lines until the last months before Germany's capitulation. Some Pe-2[/] planes were observed as early as 1942, operating as tactical bombers. The Pe-2 was well constructed and definitely superior to the older twin-engine reconnaissance-bombers, the DB-3s. It met the most satisfactory requirements in speed, armament, and flight characteristics, and its great tendency to pick up speed rapidly during dive-bombing operations made it a "hot" aircraft.[17] The Pe-2, being difficult to set afire and having good rear firepower, was one of Russia's most formidable planes. An improved type appeared somewhat later, the IL-4, a model patterned after the DB-3. In the closing months of 1944 a further, still more advanced, model of this plane emerged, known as the TU-2, which could carry heavier payloads than the IL-4 and which, with a top speed of 348 miles per hour, was manifestly faster.[18//]

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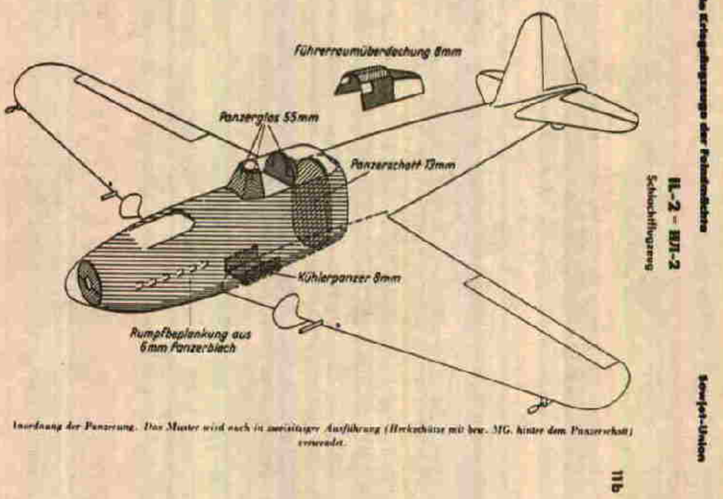
* Editor's Note: The Yak-3 was absolutely superior to both the Me-109G and the Fw-190A at altitudes below 11,000 feet, but was greatly inferior to the Fw-190 at higher altitudes. See photograph No. 7, p. 9a.

/ Editor's Note: The Pe-2 was a Soviet twin-engine reconnaissance dive bomber and bomber aircraft which saw widespread use during World War II. See Oberbefehlshaber der Luftwaffe, Fuehrungsstab Ic, "Die Kriegsflugzeuge der Feindmaechte," Teil II, Stand 1. 10. 43 (Supreme Commander of the Air Force, Intelligence Command Staff, The Warplanes of the Enemy Powers, Part 2, as of 1. 10. 1943), p. 10a. See photograph No. 8, p. 9b.

// Editor's Note: The TU-2 also had a service ceiling of 36,000 feet, which was about 6,500 feet above the service ceiling of the IL-4. See photograph 9, p. 9b.



Soviet IL-2 "Stormovik" ground-attack aircraft, showing its heavy armor.

Soviet Yak-9 fighter, a long-range version of the Yak-3.

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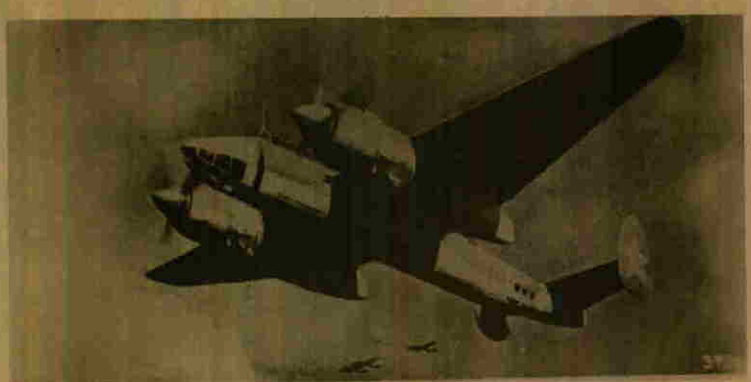
Soviet Pe-2, reconnaissance bomber.



Soviet Tu-2, light bomber.

Specific reconnaissance type aircraft were not seen on the Russian front during the early phases of the war, since these missions were generally performed by the Pe-2, by fighters such as the IL-2, and by the American-made Douglas A-20 attack plane. The U-2, a slow but unusual type of aircraft, was a reconnaissance airplane, but was chiefly reserved for use in night nuisance raids because of its astonishing imperviousness to shell fire.

Besides their own planes, the Russians also utilized many makes of aircraft produced by their allies, thousands of which they soon acquired. The overwhelming part of this support came from the United States, most of the models received being the P-39 "Airacobra," P-63 "Kingcobra," and Douglas A-20.[19*] These planes did not enable Russian pilots to achieve materially higher standards of flying performance. Disliking complex mechanisms, the Russians usually stripped the planes of all "superfluous" devices. Identical procedures were followed with respect to captured aircraft acquired from the Germans. Soviet leaders attempted, nevertheless, to secure fully operable and equipped enemy airplanes, especially the Ju-87 (Stuka), the Me-109, and later the Fw-190, which they intended to copy, a procedure in which the Russians were known to be highly successful.

The problem of spare parts was a matter of serious concern to the Soviet authorities throughout the war. This was largely the cause of the rather low number of Russian aircraft which were operational, a figure which was still further reduced by heavy demands upon combat air units. The continued use of wood and other inflammable materials in the construction and repair of their aircraft, stemming from acute shortages of aluminum and other critical metals, made a definite impact upon the morale of Soviet airmen, and gave the German flyers a great advantage for a time.

Russian airfields were generally primitive in construction with abnormally short runways. Many of them, scarcely comparable to the crudest German emergency fields, were devoid of most of the refinements found in even the simplest Western combat airfields. Barracks, steel mats, reinforced concrete or

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* Editor's Note: Between 22 June 1941 and 20 September 1945, the Soviet Union received 15,000 airplanes from the United States. The "Kingcobras" were equipped, at Russian request, with direction-finding loop antennae. See footnote 19 at the end of the narrative.

cement runways, or hardstands were unknown. Russian airmen expected this situation, but it was a great novelty to the Germans.

Like other Russian arms, antiaircraft weapons were ruggedly constructed and simple in design. They were almost invariably used without radio range or direction finding equipment and few of them possessed workable fire-direction devices. Soviet antiaircraft machine guns and light and medium artillery were equal in performance to German weapons, but their heavy antiaircraft guns were ineffective in comparison with their Western counterparts and were far from satisfactory, having severe range limitations which rendered them ineffective above 19,600 feet. The standard German heavy (8.8) antiaircraft gun (Flugabwehrkanone or "Flak") could fire up to 45,000 feet and was capable of highly effective fire at altitudes of 30,000 feet, all in rapid fire.[20]

Every Russian Army Corps at the beginning of the war had, in addition to its normal complement of antiaircraft machine guns, one or two light or heavy antiaircraft battalions. A general reserve of eight antiaircraft regiments was also on hand, consisting of battalions of three or four firing batteries each. Within the divisions, each artillery regiment possessed an organic light or heavy antiaircraft battery. Other army units had their own defenses against aerial attack, chiefly light and heavy antiaircraft batteries with antiaircraft machine guns. Besides these units, there were a few railway antiaircraft batteries, some armored railway trains with antiaircraft guns, some separate, permanently emplaced antiaircraft weapons and a home force of fixed antiaircraft defenses. With the exception of the last two categories, only half of the Russian antiaircraft units were motorized.

Antiaircraft forces existing at the opening of the war were increased fourfold in accordance with the needs for a newly activated and expanding military organization. The Russian high command had begun the task of re-equipping its air and air defense forces at the opening of World War II.

The individual equipment of the Russian soldier was good to excellent in quality. Years of experience in an adverse climate had taught Soviet supply agencies to provide adequate clothing and boots for winter. Tools and uniforms were practical and well suited to combat requirements. With these assets added to the robust health and hardiness of the average Russian, the Germans had a formidable opponent indeed.

Terrain Factors

The topography of the Soviet Union presents a much less varied appearance for its size than comparable sized areas in southern and western Europe. With the exception of the Urals, the Caucasus, the Kola Peninsula and the ridge of the Crimean Peninsula, few places rise much above a thousand feet in elevation.[21] Numerous rivers intersperse the terrain, most of them flowing from North to South, or from South to North, while lakes and extensive marshes abound in many parts of the land. Although swamps had been generally drained or modified in most parts of Europe, those in Russia remained essentially in their primitive state.

From a glance at a map it would appear that the Pripyat River might be the most promising avenue of access to the interior of Russia, especially since it is the only sizeable stream flowing from West to East. In reality, it and its tributaries form a region of formidable swamps and bogs, defying entry to an invading force. The water and terrain obstacles near the watersheds of the Dnepr, the Don, and the Volga are also admirably suited for defense against an advancing force from the West.[22] Russian camouflage and deceptive action, so dependent upon these geographical factors, were thus applied in a number of ways according to the nature of the locality and the season of the year. It should be noted, however, that a military force advancing from the West had the advantage of relatively higher stream banks on its side, due to the asymmetry of Russian stream valleys.[23]

The far North, along the coastal areas of the White Sea, is a region of scant precipitation, but high humidity, an area overgrown with tundra on a bed of permafrost. Because of these conditions, as well as insect and general health problems, military operations in the far North never approached the scale of undertakings in the other parts of the Soviet Union.

Below the tundra line, vast and often virtually impenetrable forests, swamps, and moors, so characteristic of the northern parts of Russia, enabled Soviet forces to devise remarkable measures for the concealment of their troops from the watchful eyes of German observation flyers. These terrain conditions also tended to limit the possibilities for German operations while they manifestly increased the dangers to invading German units, especially supply columns, from unpredictable Russian partisan

and troop activities. The absolute necessity of utilizing areas devoid of natural cover for troop movements and combat required the inauguration of special protective measures. Terrain suitable for all-year airfield use, for example, was normally difficult to find. Seasonal changes did not materially alter this problem.

The southern area, by way of contrast, where forests were rare, assumed in many places a bleak, steppe-like appearance, dissected by deep ravines. In the summer months the pumice-like soil becomes as hard as stone. A relatively higher degree of flexibility and inventiveness was therefore required in this terrain for the camouflaging and developing of operations. In the summer all daytime movements, including nominal airfield activities, could be readily observed by the massive dust clouds which rose to great heights and extended over an area of many miles.* In such conditions concealment became virtually impossible, except in ravines and settlements. Thus additional antiaircraft defenses became a vital necessity for any undertaking in this region. These circumstances consequently obliged the Russians to exploit darkness to the fullest during preparation for, and execution of, military operations. In the wintertime, tactical intentions of the Soviet forces were often betrayed to the German Air Force by tracks which were easily observed from the air in the very light south Russian snowfields. Some sections of this region were continuously swampy, while near the Sea of Azov the soil quickly becomes a sea of mud in the wintertime, bogging down nearly all vehicular operations.[24]

Conditions in the central area were a compromise between the conditions found in the North and those found in the South. This was a more densely populated part of Russia and offered more promising possibilities for the use of camouflage. Special concealment measures were required in many places because of the vast expanses lying along the Beresina, Druth, Sosh, Pripyat, Desna, Bug, Dnepr, Donets, and Don Rivers. Marshes were especially dangerous areas for German operations since Russian partisans usually flourished in these labyrinths. German plans to seize the Orsha Corridor, a low ridge extending roughly from Smolensk to Moscow (Landbruecke von Orscha), were hampered by the presence of innumerable swamps and bogs between the Pripyat and the Leningrad areas.[25]

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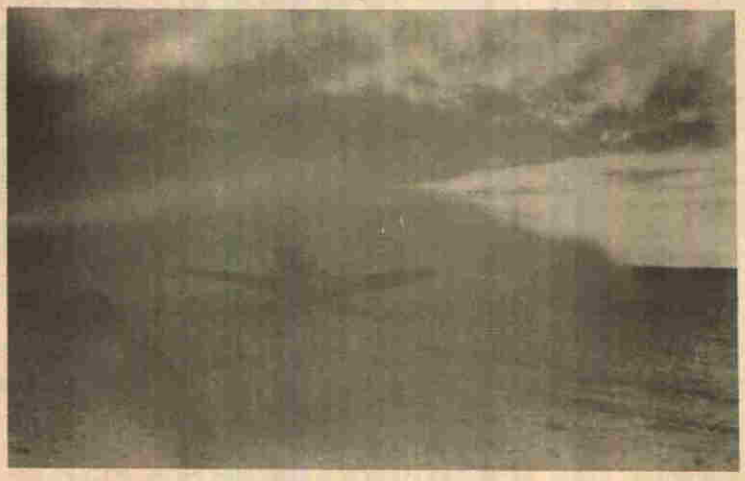
* See photographs Nos. 10 and 11, p. 13a.



Me-109 of J. G. 54 (54th Fighter Wing)
taking off in Russian dust.

Ju-87 Stukas taking off in
dusty Russian area.

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A Russian village during the muddy season (Schlammperiode).

A German airfield in Russia during the muddy season.

Equally as significant to the German high command as the unusually bitter winters in Russia were the logistical problems arising from the autumn rains and the spring thaws. To their dismay the invaders discovered that spring comes in the Soviet Union with great suddenness, especially in the central and northern regions. Massive thaws suddenly swell the streams over their banks, changing the channels and eroding the earth. Then come the deluges which complete the transformation of the soil into a sticky, gummy mass which brings all vehicular traffic to a halt.[26*]

The German Soldier

German military training was generally very good and German units were noted for sound discipline. The German soldier was far better educated than was his Russian opponent and was usually well equipped, although many of the Wehrmacht's weapons were poorly designed for the rugged type of field service found in the Soviet Union. Training and equipment for winter fighting were virtually nonexistent. The German soldier was accustomed to the short, decisive, and victorious campaigns of Blitzkrieg warfare and felt supremely confident of his abilities in the military field. He was likewise accustomed to normal European troop facilities rather than extended periods of life in the open, where he might be subject to the elements of the seasons. In his home station, the German soldier was normally quartered in large, multi-floored, permanent type barracks (Kasernen), all equipped with central heating, most of them with running water and many with parquet floors in the squad rooms. The average German air base (Fliegerhorst) was a model of up-to-date permanent station accommodations, and many were the envy of men from other branches of the service. Despite the heavy emphasis upon marching, hiking, and field exercises there had been entirely too much stress laid upon a nearly "peacetime" type of garrison life, which bore little resemblance to the stark and foreboding realities of the Eastern Front.

In Russia, German troops were required to live for long periods of time in the open, in all kinds of weather, often in vermin-infested bunkers or redoubts where clothing changes could

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* See photographs Nos. 12 and 13, p. 13b.

seldom be made. Food and medical supplies were always at a premium in the forward areas. Felt boots and other appropriate winter equipment were rarely seen by Wehrmacht troops during the winter of 1941, although the Luftwaffe and the SS seemed to have been better provided in this respect.

Demands made upon German air units were always heavy and increased steadily during the course of the war. At the same time German airmen received an ever shorter period of training, while the Russians were actually improving their training programs and rapidly improving both the quality and the quantity of their aircraft. These factors tended to accelerate Germany's loss of air superiority. Of perhaps equal significance was the fact that German military personnel had so little insight into the training, the mentality, and the general abilities of the Russian enemy. The German soldier and airman, resting upon an impressive string of victories, was soon provided with a number of startling surprises in Russia, almost all of them bad.[27]

Chapter 2

THE WAR AGAINST THE SOVIET UNION 1941-1945

The decision for war against the Soviet Union was a desperate gamble for Germany. The Luftwaffe, already deeply committed in the West and in the South, was in many ways unready for such a vast offensive on a new front unless a quick and victorious decision could be achieved. The German Army faced similar problems, but it was the German Air Force which most stoutly opposed the venture since German airmen had enjoyed no respite from battle after the fall of France in June of 1940. Time was, then, the key to the entire campaign, for unless victory could be assured at an early date, the German Air Force, despite its superior pilots and equipment, would be steadily ground down in a war of attrition. [1]

From the Opening of the Campaign through the Winter of 1941

Operation "Barbarossa" began at daybreak on 22 June 1941 when a German invasion force of 145 divisions, divided into three army groups, North, Center, and South, launched a two-pronged attack, consisting of a main effort by the left wing toward Leningrad and Kronstadt, and an offensive by the right wing, with the objective of annihilating the greater part of the Russian field army in huge battles of encirclement.* These two great wings of the Wehrmacht were separated by the swampy expanses of the Pripyat marshes which formed a natural divide. The Soviet capital, Moscow, was then only a remote objective. /

In support of the ground units were the First, Second, Fourth, and a part of the Fifth Air Fleets. Although only the VIII Air Corps of the Second Air Fleet was especially equipped and trained for close support operations, all German flying squadrons in Russia

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* See Maps Nos. 1 and 2, pp. 16a and 16b.

/ Editor's Note: Field Marshal Kesselring declared that, according to General Heusinger, Hitler greatly feared to follow Napoleon's example by selecting Moscow as a primary objective, which he thought might doom his entire venture to a similar disaster.

were charged with the support of army "Blitz" campaigns until the initial objectives were attained. Primary in importance was the liquidation of hostile airpower.[2]

Suspicious of their German "allies," Russian leaders had undertaken certain defensive measures before the outbreak of the Russo-German war.* Nevertheless, Germany's opening assault upon the Soviet Union was a severe blow. Within five days the Luftwaffe had destroyed hundreds of enemy planes on the ground and swept most of the Russian Air Force from the skies, establishing a virtual air supremacy.[3] Soviet aviation weaknesses soon became apparent on every front. Wherever the main offensives of the Wehrmacht were concentrated, the Luftwaffe quickly established air supremacy. It likewise inflicted heavy damage upon Russian road and rail networks, which, being more thinly spread than comparable networks in western Europe, were highly important to the Soviet war economy.[4/] By 28 June the German government confidently announced that its armed forces had captured 400,000 Russian prisoners, and had destroyed 2,000 enemy tanks and at least 4,000 airplanes, while losing only 150 planes.[5]

German commanders hoped to reach a position by winter extending roughly from Lake Onega in the North to the mouth of the Volga in the South. With the onset of autumn and the muddy season (Schlammperiode), it became clear that this objective could not be realized. In the North Estonia was not completely overrun until early September, and other northern operations had generally progressed much more slowly than had been anticipated, despite able Finnish assistance. Murmansk was not cut off from its connections with the interior of Russia or from its thriving sea trade with Europe and America, while Leningrad could neither be captured nor completely surrounded, making it one of the major obstacles to meeting Hitler's timetable for victory.[//]

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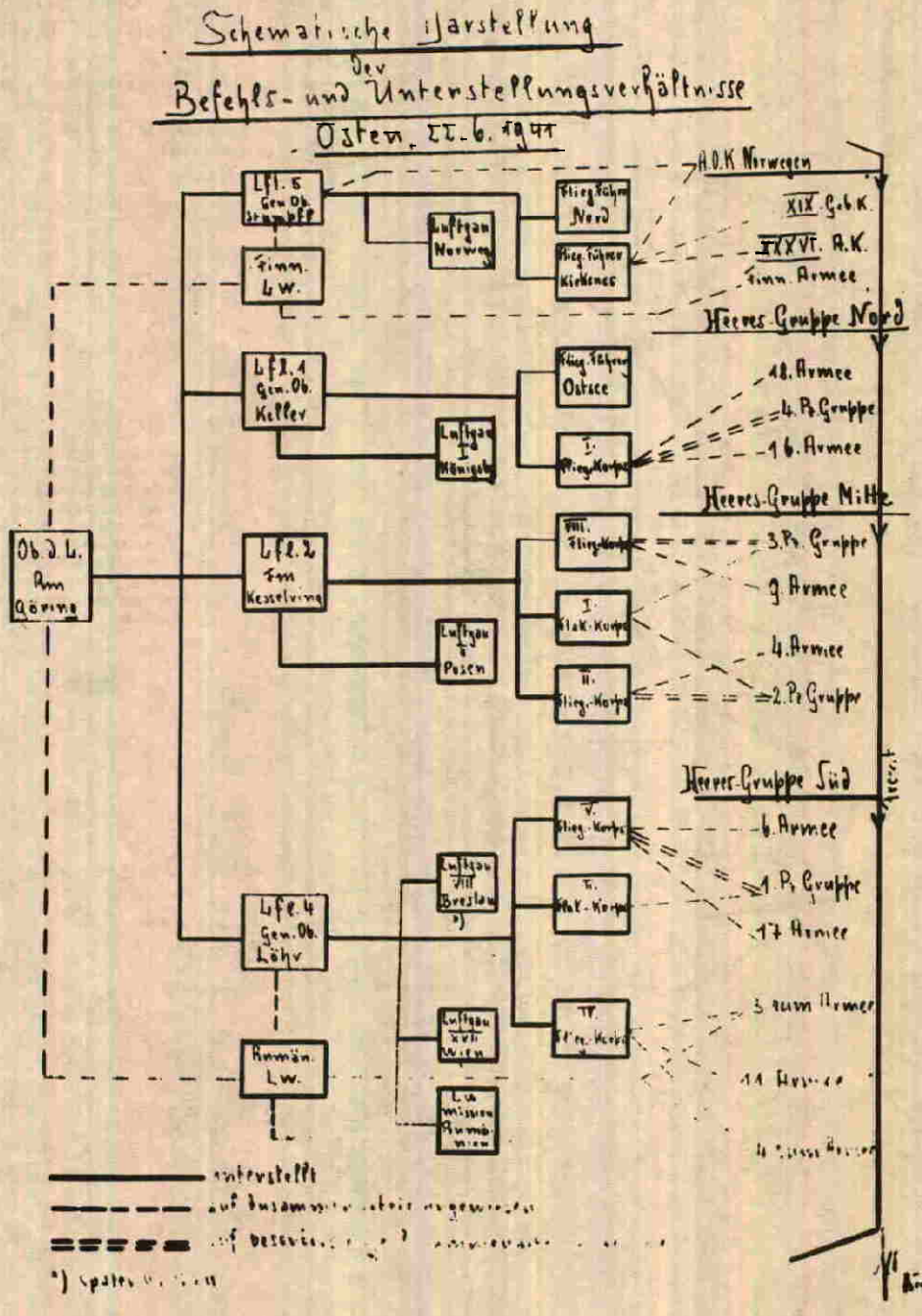
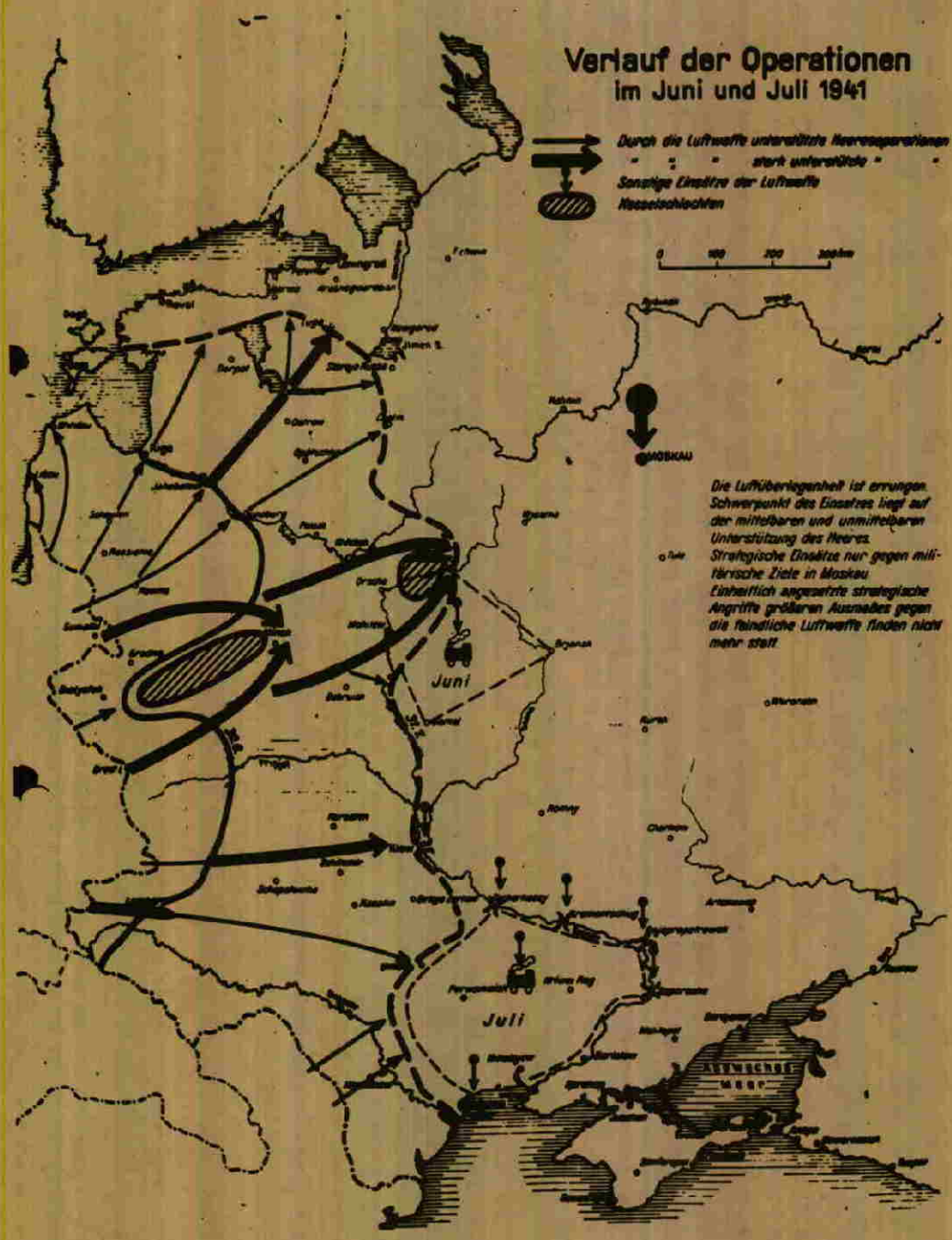
* Editor's Note: Prior to 22 June 1941 Soviet leaders had seized key strategic areas neighboring the U.S.S.R., had already undertaken a modernization of their military forces and military industry, and had begun the evacuation of key war plants to the East, out of potential war zones.

/ See photographs Nos. 14 and 15, p. 16c.

// See Map No. 3, p. 16d.



GAF and Army command relationships, Eastern Front, 22 June 1941.

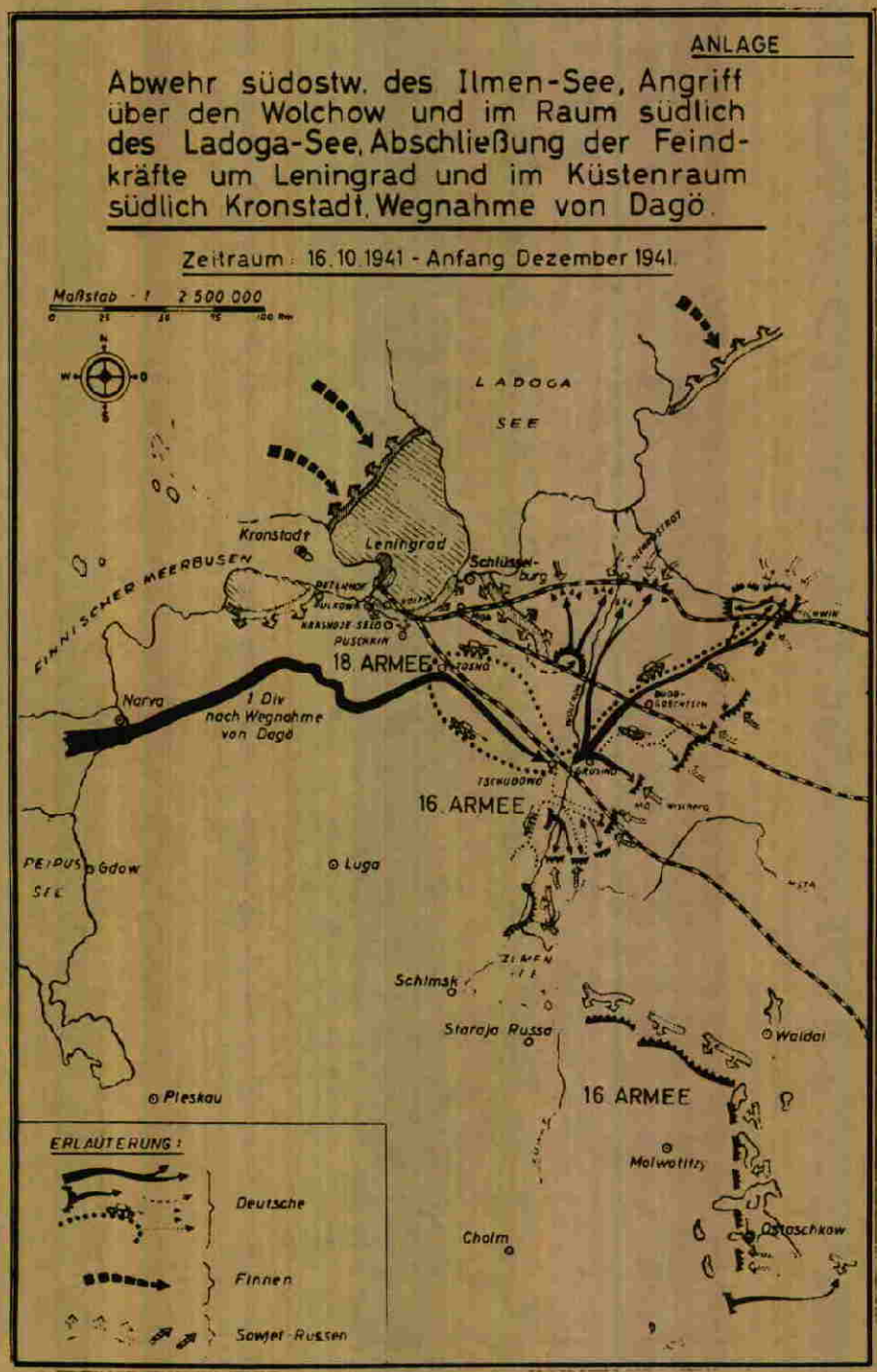


Course of German operations, Eastern Front, June - July 1941.

16b

Transport vehicles damaged by
the GAF in Russia, 1941.

Supply columns destroyed during the
air interdiction of Kiev, 1941.



German attacks upon Leningrad and Kronstadt, October - December 1941.

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Army Group Center, supported by the II Flakkorps and the VIII Air Corps, moved ahead more rapidly than other army groups and soon became Germany's first area of concern because of over-extended supply lines.

In the South, German offensives were blunted by obstinate Soviet resistance. Between the Carpathian mountains and the Pripyat swamps the German front, supported by the V Air Corps of the Fourth Air Fleet, advanced only 180 miles to the East. Nearly three months passed before German troops were able to capture Kiev. Large numbers of Russians were captured in the southern offensives, but many others withdrew to safety.

In his original directive Hitler declared that Leningrad must be taken before an assault could be made upon Moscow. He soon deviated from this plan. On 1 October a massive offensive was opened against the Communist capital along a 300-mile front.[6] An early frost hardened the ground to facilitate the offensive, but the time was short before the untimely onset of what proved to be an unusually severe winter hampered operations more than did the mud. *

Some units of Army Group Center drove to a position about 15 miles from Moscow, but a spirited Russian defense, strengthened by the arrival of lend-lease supplies and materiel from recently evacuated Soviet war plants, prevented the Germans from taking the city. As the German Army stood deadlocked before Moscow it had already conquered a large part of European Russia and captured hundreds of thousands of prisoners in the encirclements of Bialystok, Minsk, Smolensk, Uman, Gomel, Kiev, Vyasma-Bryansk, and in the area north of the Sea of Azov. † But its own losses were impressive, for by early 1942 more than 210,000 Germans lay dead in Russia, over 700,000 had been wounded, and more than 90,000 were seriously injured by frostbite.

The Luftwaffe had meanwhile been drawn into an increasingly narrow role on all fronts in direct support of army operations, and

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* Editor's Note: Luftwaffe units soon learned in the severe cold that they could not hope to start their aircraft engines if they were stopped overnight. To prevent this occurrence, shelters and special engine warmers were soon provided. See photograph No. 16, p. 19c.

† See Maps Nos. 4 and 5, pp. 19a and 19b.

it appeared that the German Air Force had lost sight, at least for the moment, of the cardinal objective of airpower: the establishment and maintenance of air superiority.[7]

A number of factors were responsible for Germany's failure to put Russia out of the war in 1941 with a speed comparable to that noted in the defeats of Poland, Norway, and France. The important cities of Murmansk, Leningrad, and Kronstadt had not been taken, which weakened the overall strategic picture. Besides these, the significant communication center, Moscow, remained unconquered, a psychological and material victory for the Soviet Union. Moreover, in the South, despite Germany's enormous booty in prisoners and materiel, and its successful advance beyond the Don River by the year's end, the Russian lines had been generally bent backward rather than completely severed, which permitted Soviet leaders to arrange a defense in depth and prevented the annihilation of the Russian field armies. At the same time, German Army units frequently overextended their lines of communication. Luftwaffe Flak batteries were also drawn into an increasing number of direct-fire ground defense actions by the army, especially against armored equipment. By the turn of 1942, nearly all of the German antiaircraft batteries in Russia had fallen under the direct control of army commanders. Flying units of the Luftwaffe, despite their brilliant accomplishments, had not eradicated the Russian Air Force nor destroyed the Soviet ability to produce countless numbers of more modern aircraft.

Another factor worth consideration was that by 1942 the stream of deserters to the German side had been reduced to a trickle by the oppressive measures of the dreaded Russian MVD,* by a carefully planned Soviet propaganda campaign, and by the cruelty and stupidity of German government occupation authorities. The MVD, with its vast network of agents, was eminently prepared to stifle sabotage and espionage attempts. Persons found guilty, or suspected of being guilty, of passing German propaganda leaflets, making anti-Soviet or defeatist statements, or of giving any form of aid or comfort to the enemy, were publicly tortured and liquidated to impress the populace. Soviet propaganda was also highly effective, since it asserted that the cause of the Party and the government were identical to the cause of the Russian people. The war was made a great patriotic fight. Groups likely to favor German interests and

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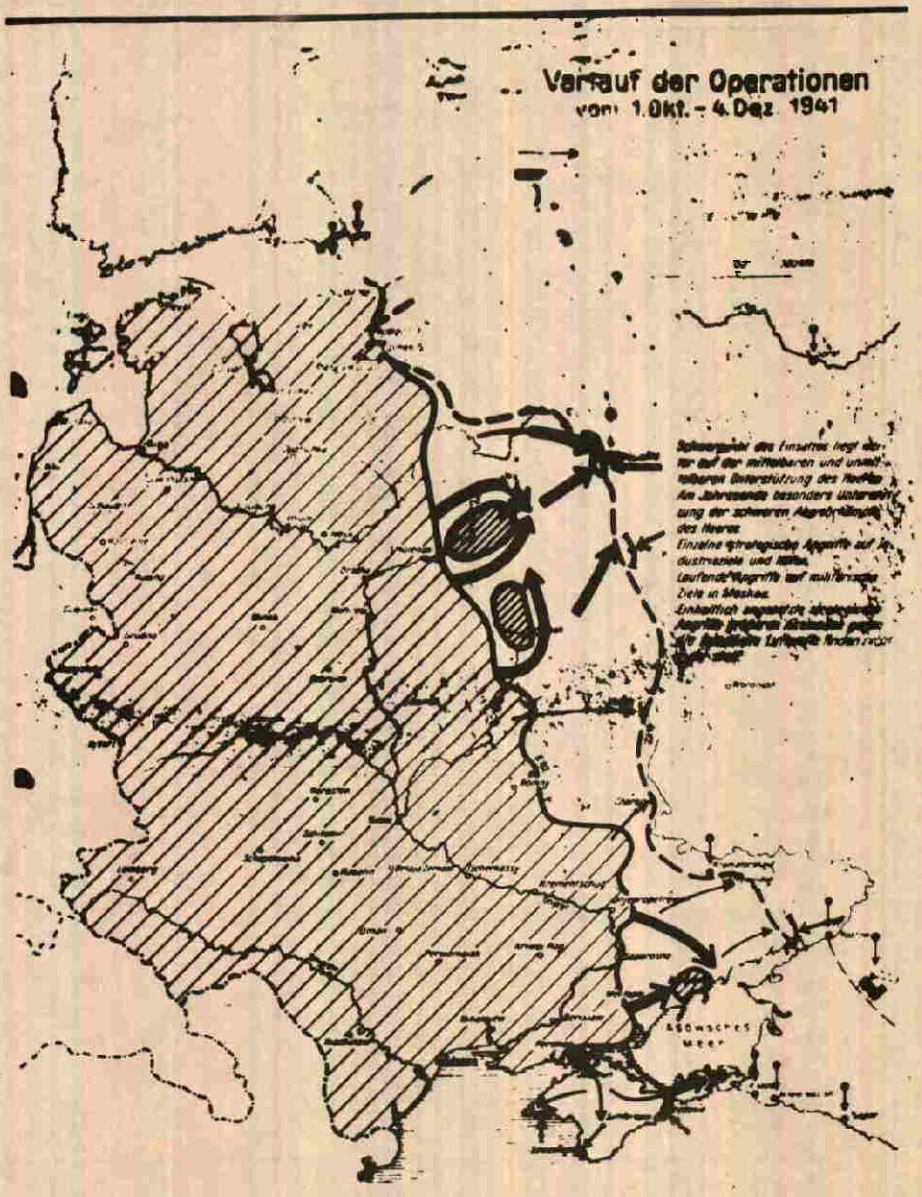
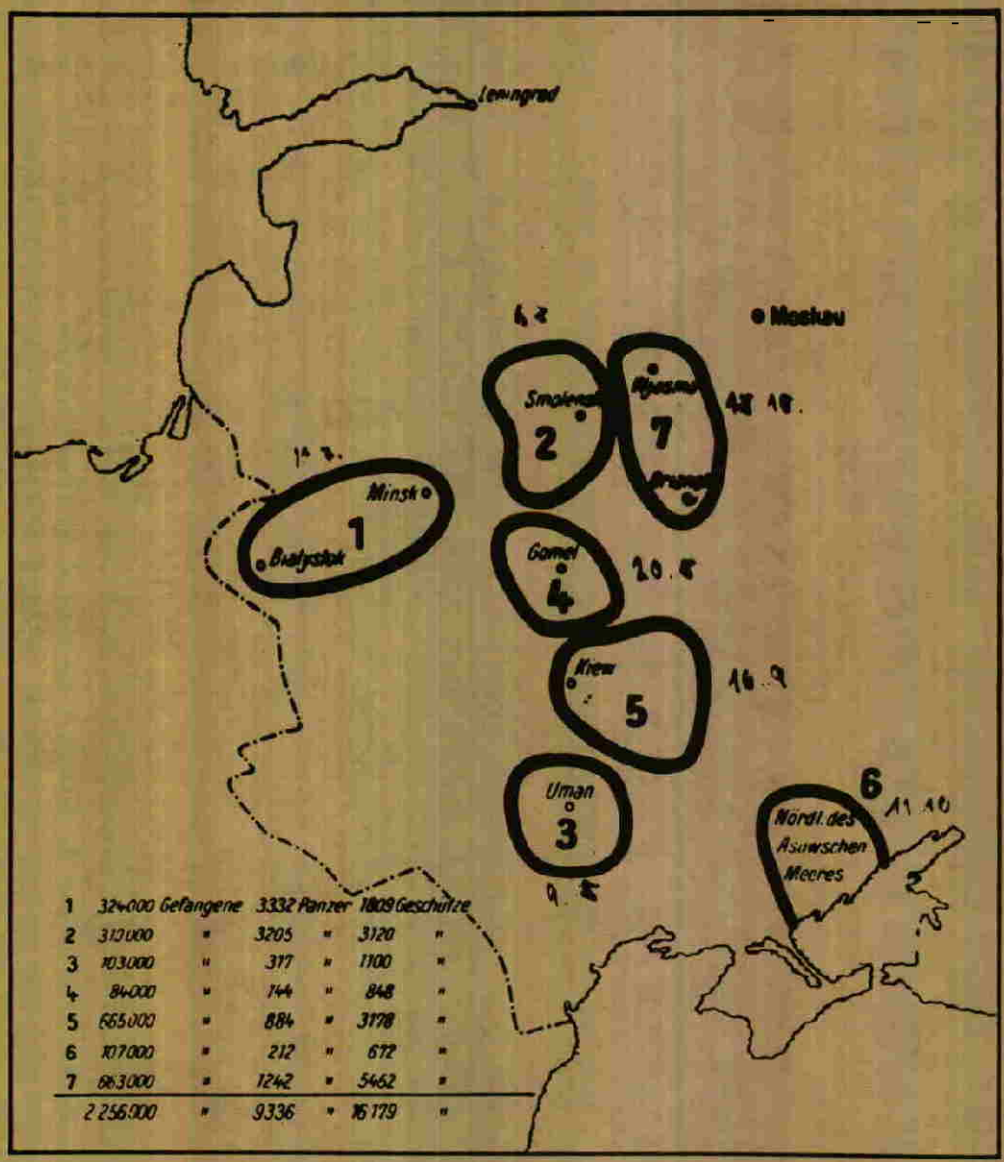
* Editor's Note: The Secret Police of the U.S.S.R., an outgrowth of the N.K.V.D.



Extent of the German advance, Eastern Front, December 1941.

Die 7 großen Kesselschlachten des Ostfeldzuges 1941



1	324000	Gefangene	3332	Panzer	1809	Geschütze
2	313000	"	3205	"	3120	"
3	103000	"	317	"	1100	"
4	84000	"	144	"	848	"
5	665000	"	884	"	3178	"
6	107000	"	212	"	672	"
7	663000	"	1242	"	5462	"
	2256900	"	9336	"	16179	"

The great battles of encirclement in the East, 1941.

Warming stoves for German aircraft engines in Russia, 1942.

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persons who had spent time under German control were viewed with deep suspicion by both Party and MVD officials. Thus while Soviet agents could operate with relative freedom behind German lines, the opportunities for similar activities by German agents were virtually nil.[8]

From the Winter of 1941 to 1943

After the failure to take Moscow, German forces in the central sector were obliged to withdraw. Russian counter-offensives forced Field Marshal Guenther von Kluge* to pull Army Group Center back to a line just east of Kursk-Orel-Sukhinichi-Yukhov. Only maximum efforts by German air and ground personnel prevented the Russians from scoring a massive breakthrough near Rosslavl. Angered by the hasty retreat of the Wehrmacht in December of 1941, Hitler summarily dismissed Field Marshal Walther von Brauchitsch† from his post as Commander-in-Chief of the German Army and retired most of the older, more experienced field commanders on the Eastern Front. The Fuehrer then took personal command of the operations of the army.

Heavy losses in the northern and central sectors, complicated by supply problems, precluded any early German offensives in those areas for 1942. Therefore the high command determined to make use of the relatively better prepared forces of Army Group South to isolate Soviet forces from their supplies of oil and other critical materials. The plan entailed the seizure of the industrial network around the upper Volga by Army Group "B" and the newly organized Army Group "Don," whose left wing faced the city of Stalingrad, and the capture by Army Group "A" of the port of Baku on the Caspian Sea, and therewith the rich oil region of the Caucasus.

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* Editor's Note: An eminent field commander who was involved in the 20 July 1944 plot against Hitler, von Kluge committed suicide on 19 August 1944 when he was summoned to appear in Berlin, doubtless for Gestapo interrogation.

† Editor's Note: Field Marshal von Brauchitsch died in 1948 in an English prison.

In the far South, Field Marshal Erich von Manstein* and his Eleventh Army spent the spring and summer of 1942 mopping up the entire Crimean Peninsula and strengthening German positions along the Sea of Azov. Forces in this area, however, were constantly threatened by Russian units based at Tuapse and other points along the eastern coast of the Black Sea, a threat which was to have been eventually solved by later operations south of the Caucasus mountains.

By the end of August, Army Group "A" had penetrated deeply into the Caucasus area and had become dependent upon the port of Rostov for its materiel support. North of it, Army Group "Don" was approaching the vicinity of Stalingrad on the Volga River. Russian forces, now bolstered by Siberian reserves and large amounts of new lightweight equipment, stiffened their resistance all along the German front from Stalingrad to the Caspian Sea, causing considerable anxiety for the safety of German forces in the Caucasus. By October Russian counterattacks brought the operations of Army Group "Don" to a virtual standstill before Stalingrad, while a logistical crisis threatened Army Group "A."[9] It was clear that the Caucasus could not be held if Soviet forces should score a breakthrough near the Sixth Army of Army Group "Don" at Stalingrad, since Rostov would then be endangered, and with it the supply of all German units situated east of that place.[10]

By November all eyes were fixed upon developments around Stalingrad where the German Sixth Army under Generaloberst Friedrich Paulus† found itself threatened by encirclement. Early

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* Editor's Note: Holder of the Knight's Cross and reputed to be Germany's best strategist of World War II, von Manstein was by nature and character much more quiet and reflective than Hitler, with whom he was often in disagreement. On 22 November 1942 he assumed command of Army Group "Don," and on 14 February 1943 he became commander of Army Group South (Sued). He resigned 30 March 1944 after a final argument with the Fuehrer over strategy in the East.

† Editor's Note: Hitler sent Paulus his promotion and Marshal's baton by air on 30 January 1943, just in time to make him the first German Field Marshal to be captured in World War II.

and repeated demands by the commander of Army Group "B," Field Marshal von Weichs, * that the Sixth Army be allowed to withdraw were rejected by Hitler, who ordered it to remain in position without "retreating a step." Goering, and perhaps also Jeschonnek, † bore much of the responsibility for Hitler's decision by assuring the Fuehrer that the Luftwaffe could satisfy all of the logistical demands of the Sixth Army in case of trouble. [11]

The situation for Paulus' unit became increasingly hopeless after the Russian breakthroughs at Kletskaya and Serafymovich on 19 November. Three days later the Sixth Army was encircled and under heavy fire. German bombers and other combat planes were converted into transports in an effort to supply the beleaguered army, but these ventures were wanting from the outset. Adverse weather and hordes of Russian fighters, many of which were of the latest type, made operations still more difficult. The Sixth Army required a daily logistical support of 550 tons of food and 400 tons of fuel and ammunition for minimum operations. The inability of the German Luftwaffe to meet these heavy requirements, †† and the failure of the army and air force to liberate the entrapped troops, insured the defeat at Stalingrad, Germany's greatest of World War II up to that time. Starving and badly decimated, the Sixth Army surrendered on 31 January 1943. Thus countless German and allied units and their staffs, a total of over 90,000 men, fell into Russian captivity. [12] Hundreds of German flyers lost their lives in attempting to save this organization, and an entire wing of He-111 bombers, used as transports, were added to the toll. [13]

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* Editor's Note: Maximilian Freiherr von Weichs auf Glonn. Tried at Nuremberg for conspiracy to wage war, he was released for reasons of health in 1948.

† Editor's Note: Generaloberst Hans Jeschonnek served as Chief of the General Staff of the German Air Force from 1 February 1939 to 19 August 1943, and as Chief of the Air Force Operations Staff during this time from 10 April of 1942 to mid-March of 1943. He committed suicide on 19 August 1943.

†† Editor's Note: The largest delivery was made on 19 December 1942, when 289 tons of supplies were brought in. See Generalmajor Hans-Detlef Herhudt von Rohden, Die Luftwaffe ringt um Stalingrad (The Air Force contends for Stalingrad), Wiesbaden: Limes Verlag, 1950, p. 36.

On other parts of the front Hitler's adamant position prevented his commanders from making use of their superior tactical training in the organization of mobile defenses. German forces were thus spread along a line which they could not hope to defend against the superior human and material resources of the Soviet Union. A number of Russian breakthroughs occurred, forcing the Germans into small defensive pockets which were at once in danger of encirclement and annihilation. Often they could be supplied only by air, an insuperable task for an air force lacking adequate aircraft and upon which tremendous demands were already made. Air transport operations of this sort increased sharply throughout 1942, despite a concomitant loss of transport aircraft. German pilot losses forced the high command to muster training personnel at home for airlift and combat flying duties. The total inability of the Luftwaffe to satisfy the logistical requirements of many isolated army units contributed to a strengthening of Russian positions between Army Groups North and Center, a situation which was later to cause trouble.[14]

The Turn of the Tide 1943

The year 1943 heralded the rapid decline of the German position in the East, including air superiority. From that time forward both army and air forces found themselves generally on the defensive. Operations centered around deep Russian breakthroughs, frantic German delaying actions using all available combat airpower to stem the tides, and hasty withdrawals by German forces to prevent encirclement and destruction. It was the turning point of the war, certainly in the air.[15]

Germany's fundamental problem in Russia was the conquest of space. This could be achieved only by a far superior mass of manpower and materiel or by the possession of much greater mobility, neither of which the Germans had in 1943. The acuteness of logistical problems at the same time forced German troops to place an ever greater reliance upon Soviet transportation methods such as the Panje wagon* and sled for supplying forward units.

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* Editor's Note: A crude, horse-drawn wagon with V-shaped body, widely used by the Russians to transport goods. Germans were quick to see the merit in such simple expedients. See photographs Nos. 17 and 18, p. 24a.

After the defeat of the Sixth Army at Stalingrad it was clear that the Wehrmacht could not long hold the Caucasus. Soviet leaders, encouraged by the apparent stupidity of German strategy as demonstrated by Hitler with respect to Stalingrad, and confident of the massive numerical superiority of the Red Army, continued their offensives on all fronts. Soviet ground forces moving northward and westward from the Caucasus and the Caspian Sea areas threatened to corner the defenders of Army Group "A" (First Panzer Army and Seventeenth Army) near the Sea of Azov south of Rostov. Other Russian armies opened a gap in the right wing of Army Group "B" and drove to the southwest across the Don River in the direction of Voroshilovgrad and Kamensk, where troops of Army Group "Don" fought desperately to prevent the seizure of Rostov from the north and thereby the isolation of Army Group "A."

North of them, rolling Russian offensives were soon able to pierce the thin German defenses of Army Group "B" between Kursk, Belgorod, and Kharkov, threatening to flank Army Group "Don" from the North and eventually to encircle Army Group "A" near the Sea of Azov. During this difficult situation, Generaloberst Ewald von Kleist* used all of the air support at his disposal to withdraw the First Panzer Army of Army Group "A" behind the lower Don.[16] By the end of February it was behind the Mius River with Army Group "Don," although the Army Detachment Hollidt was closely harried by the enemy. Rostov and the lower Donets basin were in Russian hands.[17]

Immediately to the north of this area, the cities of Kursk and Kharkov had fallen to the Russian forces, while a breakthrough near Sukhinichi (about 140 miles southwest of Moscow) in the direction of Bryansk threatened to envelop the Second Panzer Army of Army Group Center which was situated in a salient projecting to the east of Orel. Air interdiction by the Luftwaffe prevented the Russians from closing the circle for nearly a month, until the trapped unit was able to make good its escape. On 14 March, before the onset of the muddy season, von Manstein opened a counteroffensive with the somewhat weakened Army Group "B." He was soon

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* Editor's Note: Kleist, a great commander and later a Field Marshal, from a famous Prussian family, was often at odds with Hitler. The U.S. Government delivered him in 1946 to Belgrade, at Yugoslavian request. In 1948 he was turned over to the Soviet Union, from which rumors have come that he died in a prison camp.

able to recapture Kharkov and to straighten the defense lines from Kharkov to Voroshilovgrad. By April many small corners of enemy resistance had been mopped up and German lines were put in reasonably good defensive condition.*

A further offensive, given the code name Zitadelle (Citadel), was directed by von Manstein in cooperation with Army Group Center under Generaloberst Walter Model.† The plan consisted of an attack from the north of Kursk and from the south of Belgorod to cut off the Russian salient which extended to the west along the Seym River as far as Rylsk. At the same time Army Group South was to throw the Russians back along the Mius and Donets Rivers from Taganrog on the Sea of Azov to Kharkov. Because of the late arrival of additional armored equipment the action was delayed until 5 July. The 12-day campaign was fruitful in prisoners and materiel, but was of limited lasting effect. Most of the successes were scored in the area of Army Group South. The salient at Rylsk was never destroyed. When operation Zitadelle was broken off, the initiative immediately passed to the Soviet forces, which started offensives against Army Groups South and Center.[18]††

In the autumn, masses of Russians poured through the positions in Army Group Center, capturing Bryansk, Smolensk, Dnepropetrovsk, and Kremenchug and penetrated beyond the Dnepr River north of Kiev. There the fighting was bitter during the months of November and December, but by 1944 the issue was decided in Russia's favor. Soviet troops then pushed rapidly into the Pripyat swamp area, a region always filled with partisans, where Germans could hold their lines only with great difficulty.[19]**

In the South, the Seventeenth Army of Army Group "A" had until this time remained on the eastern shore of the Black Sea at the Kuban bridgehead, but was soon forced to withdraw to the Kerch Peninsula, where it was again in contact with the right wing of Army Group "A" stationed in the Crimean Peninsula. By the end of October

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* See Map No. 6, p. 24b.

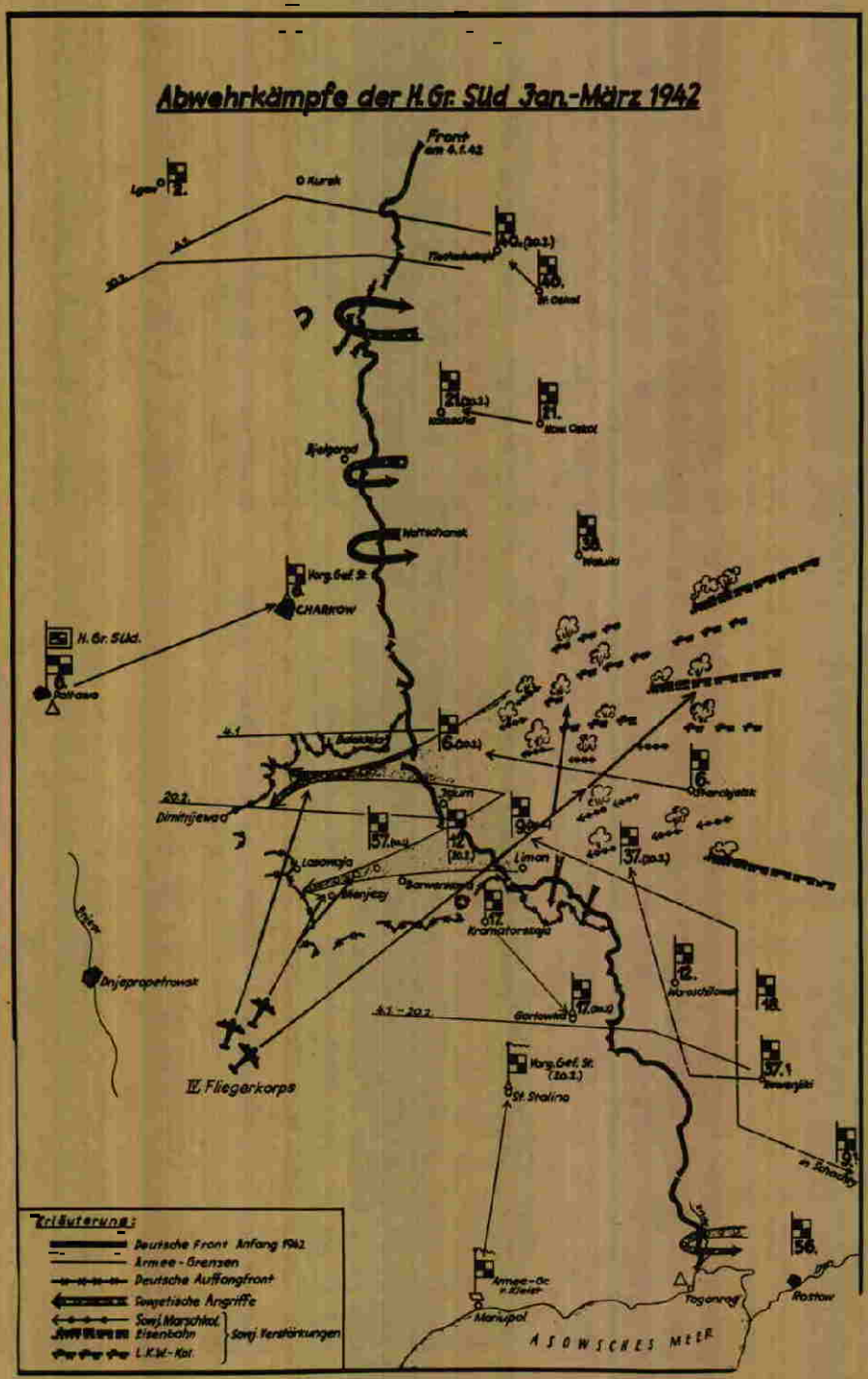
† Editor's Note: Model apparently enjoyed the confidence of Hitler, who made him a Field Marshal on 1 April 1944. He later commanded Army Groups D and B in the West, and committed suicide on 17 April 1945.

†† See Map No. 7, p. 24c.

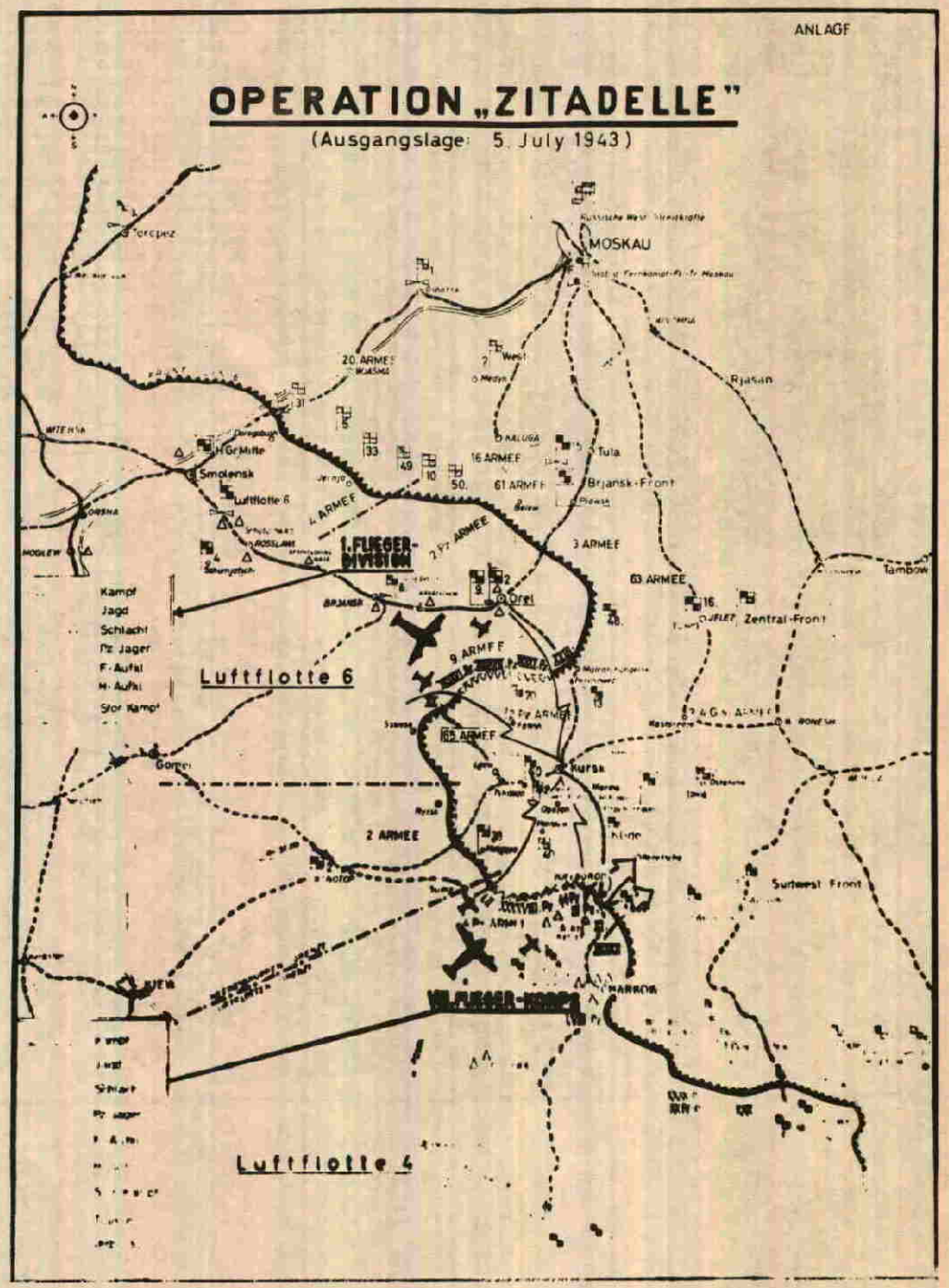
** See Map No. 8, p. 24d.

German workmen building Panje wagons
at an airfield in Russia.

Transportation at a German air base
in Russia, using Panje sleds, 1942.

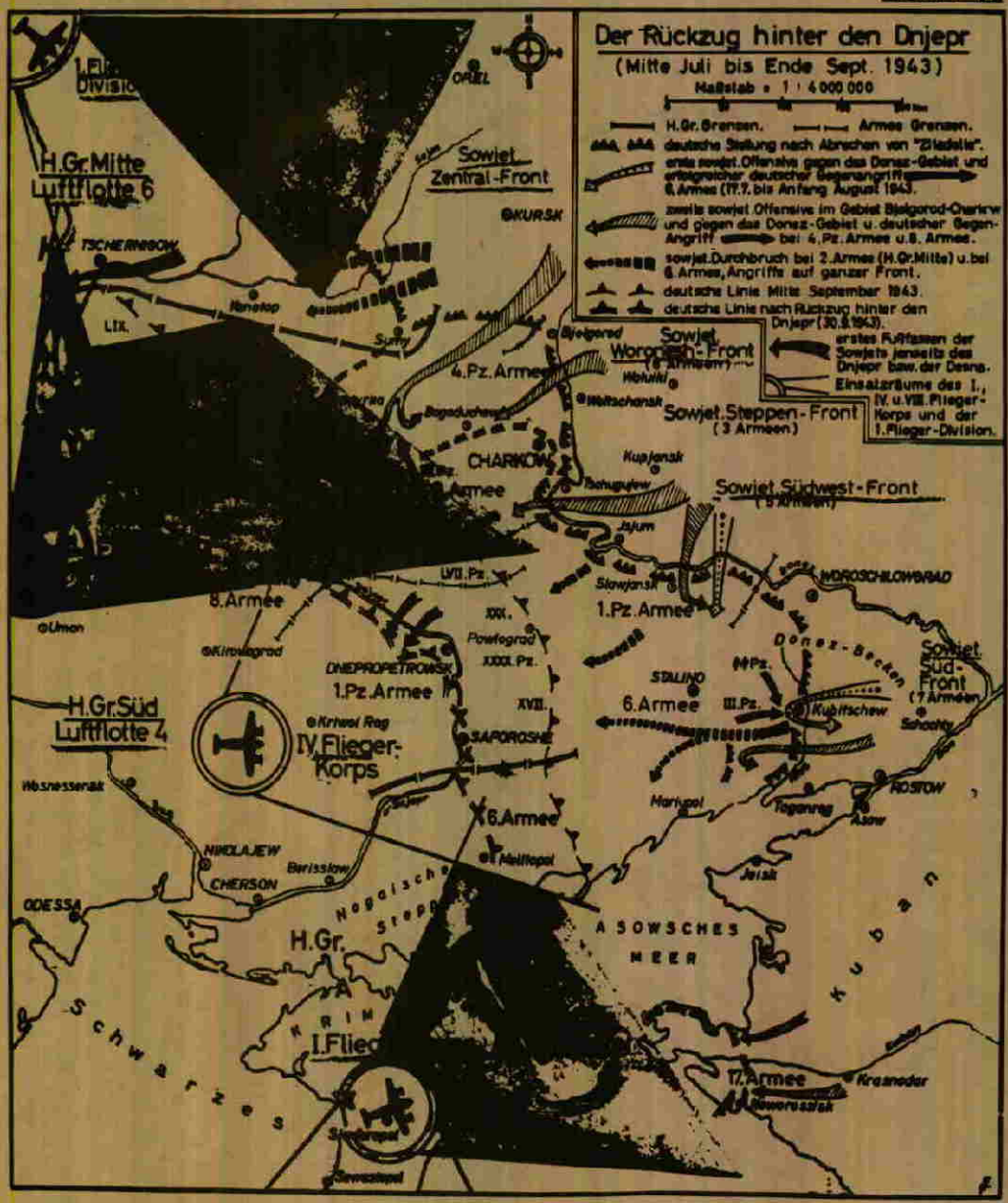


Defensive battles of Army Group South, January - March 1942.



The GAF and Operation "Zitadelle," March - July 1943.

ANLAGE 15



German withdrawal behind the Dnepr,
July - End of September 1943.

Army Group "A" was forced to withdraw from the Kherson Peninsula in the Crimea, taking up defensive positions near Perekop where, ironically, the Russians had defended themselves against the Germans more than a year before.[20*]

In the area of Army Group North the Russians succeeded in opening the land route to Leningrad which had been held by the German forces for the past 17 months. Thus ended the last German hope for conquest of that city.

From 1944 to the End of the War in 1945

By the beginning of 1944 Russian offensives had penetrated to the former Polish boundaries south of the Pripyat marshes. A spirited, but futile, German counterattack was partially enveloped near Cherkassy[/] by the army of Marshal Ivan Koniev,[//] and in mid-February this part of the German Eighth Army was encircled and under attack. The VIII Air Corps actually succeeded in flying in about 250 tons of supplied daily to the defenders, using Ju-52 transports. Von Manstein in his last, and one of his best, operations was able to liberate about 32,000 troops of this 50,000-man organization, although many of the severely wounded had to be left to their fates.[21]

The muddy season began in March, which slowed the Soviet offensives somewhat, but not enough to provide a proper respite for the German units, which had fallen back to the Bug River.[**] Within a month German forces in the South were in retreat to the Dniester River and then to the Prut. In April Russian troops reached the eastern end of Czechoslovakia.

In the North, despite rather limited air support, German units had not suffered such high attrition rates, which permitted

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* See Map No. 9, p. 26a.

/ Editor's Note: Cherkassy is located on the Dnepr River about 100 miles southeast of Kiev. See Map No. 6, p.

// Editor's Note: General El Campesino states in his work Communiste en España, (pp. 73-85) that Marshal Koniev was in Spain along with Kleber (Stern) and Malinowsky during the Civil War 1936-1939. Soviet publications, however, state that Koniev was on duty in the Soviet Union during the war in Spain.

** See Map 10, p. 26b.

their commanders to carry out more methodical defense measures than was the case elsewhere on the Eastern Front. But even here their forces were obliged to withdraw to a stronger defensive position behind the Narva River, where, by holding certain key positions, they staved off early Soviet attempts to break into Latvia and the other Baltic States.

By attack and infiltration the Russians soon cleared the Pripyat swamp of German troops. Powerful offensives were then opened in the direction of Minsk and L'vov and on 23 June upon the main body of Army Group Center. In July of 1944 the cities of Wilna and Grodno were taken and a month later the Red Army had reached L'vov and the San and Vistula Rivers.[22]

In the Crimean Peninsula a catastrophe comparable to Stalingrad was narrowly averted by the German Seventeenth Army. Since early November of 1943 it had been in mortal danger of encirclement. Left to defend the narrow isthmus of Perekop after the evacuation of Army Group "A," the Seventeenth Army was threatened anew on 4 April 1944 by a Soviet assault. Moving with great dispatch, it succeeded in pulling its troops back to Sevastopol and thence to points further west. This primarily sea operation was accompanied, however, by heavy German losses.[23]

Capitalizing upon German errors and weaknesses, Russian forces in 1944 and 1945 swept through Eastern Europe,* forcing the Germans to take one desperate gamble after another. Even recently wounded men were sent back into combat in efforts to stem the tide. Underage, overage, and limited-service personnel were pressed into service, while flying and maintenance troops of the Luftwaffe were often thrown into the breaches with the ground forces. German ground and air units were obliged to regroup and to activate new units when regular wings, groups, squadrons, divisions, and regiments were ground to pieces in the attrition of the multi-front war. Entire air fleets were organized from the residue of former units.

After 1943 the Luftwaffe had lost its command of the air except in isolated local situations. A few strategic air operations were carried out in early 1944, just as they were in 1943, but the heavy losses of the German Army compelled all air units to go to the support of the ground forces. Saddled with the weighty responsibility

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* See Map No. 10, p. 26b.

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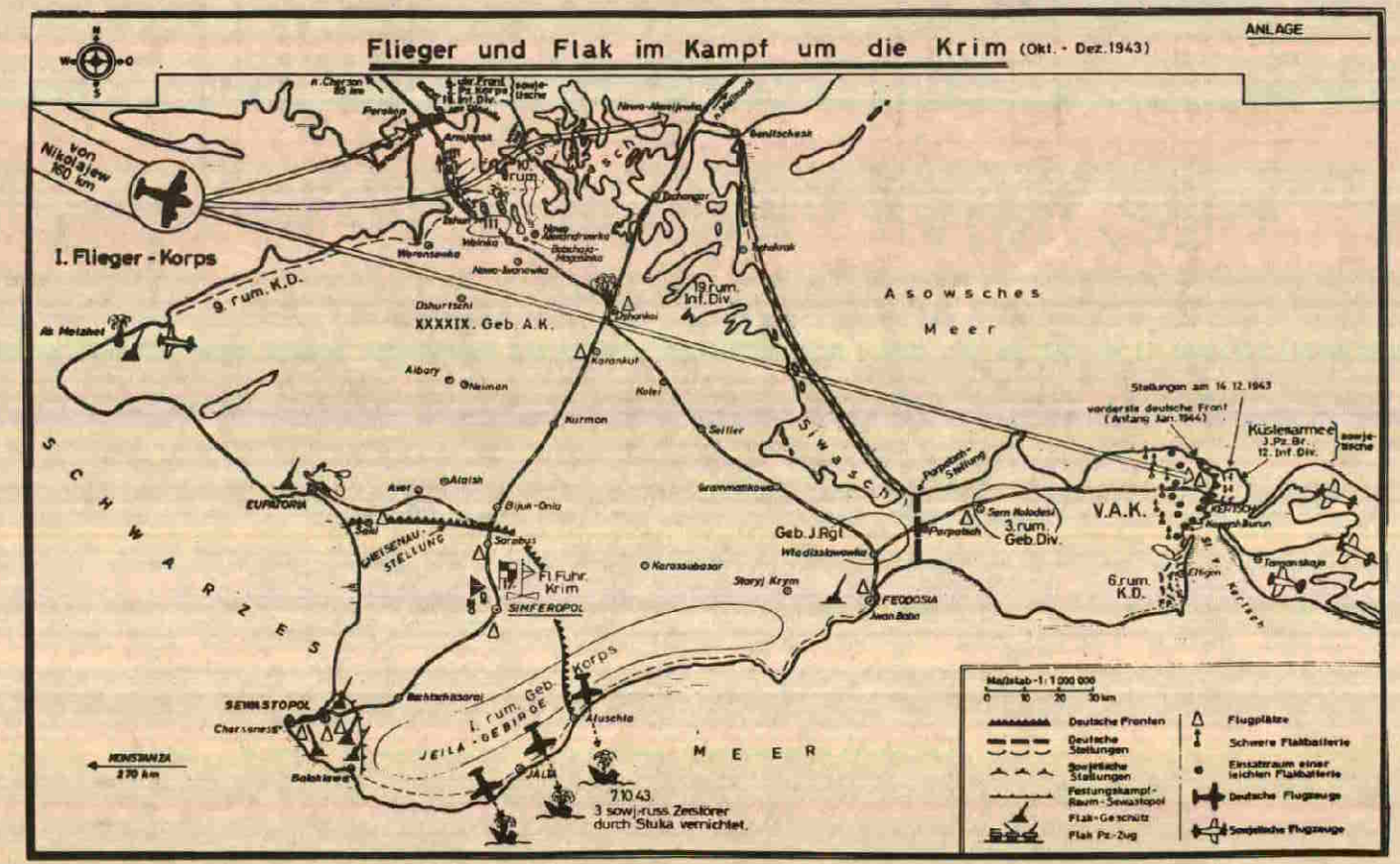

The GAF in the battle for the Crimea, October - December 1943.

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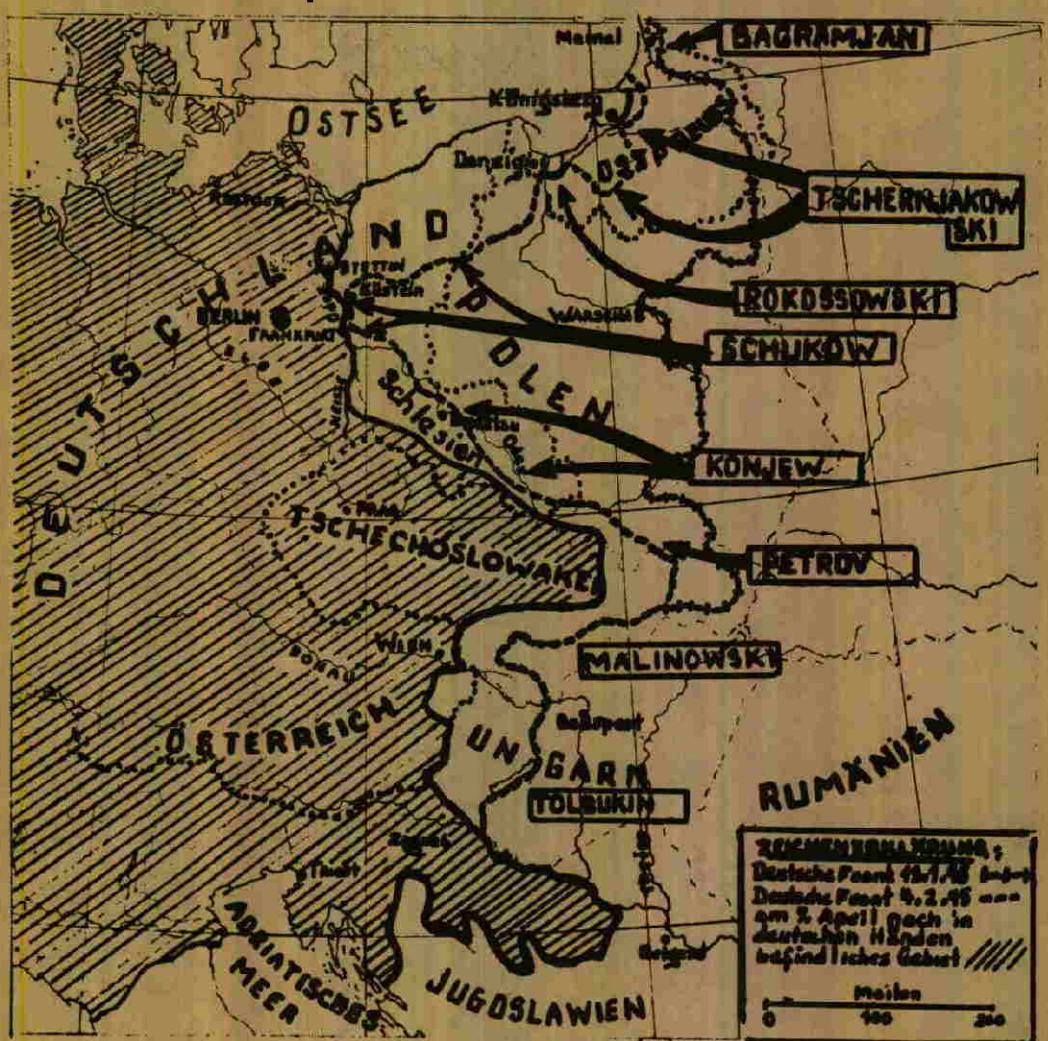
Anlage 16



General situation, Eastern Front, February - April 1945.

of extinguishing numerous "fires" on all parts of the front, the Luftwaffe lost its individuality as it became enmeshed in the fortunes of the army at the front. As the war drew to a close it was clear that it could not even perform the required support tasks.[24]

Many German flyers distinguished themselves in action against the Soviet Union. Colonel Hans-Ulrich Rudel,* for example, personally accounted for one battleship and more than 500 Russian tanks. Remarkable as were Rudel's achievements and those of his fellow pilots, a systematic assault upon the Russian aramament industry would have had more lasting effects. Thus, despite their courage and experience, the efforts of dozens of German air aces could not materially alter the military situation in the East for very long, an affair which was, in any case, largely decided upon the ground.

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* Editor's Note: Colonel Rudel was the most highly decorated German flyer. Already the recipient of the Knight's Cross of the Iron Cross with Oak Leaf, Swords, and Diamonds, Hitler created for him the unique addition of a Golden Oak Leaf.

Chapter 3

THE SOVIET COMMAND AND COMMAND DECISIONS

At the pinnacle of the Soviet military pyramid stood Premier Joseph Stalin, who, upon the outbreak of war, had assumed the title of Marshal of the Soviet Union. Stalin, who called the war against Germany the "Great Patriotic War" and the "Great Fatherland War," probably exerted a greater influence upon the strategic thinking and planning for the Soviet armed forces than any other single person. He manifested a great interest in military affairs and frequently sat with the Stavka (supreme planning staff) during its most critical deliberations. [1]

The Principle of Cooperation

Military operations were executed as nearly as possible in conformity with Stalin's basic demand for a harmoniously integrated war effort by all arms and services in the Soviet Union. This precept dominated all phases of Russian planning and preparations, as well as the execution of air and ground operations. Indeed, Stalin later claimed that interservice operational cooperation decided the outcome of the war in Russia's favor.

During the early part of the war, however, heavy losses sustained by the Russian Air Force and Army, and inadequate tactical training, prevented the realization of Stalin's plan. As late as the summer of 1942 the war situation for the Russian Air Force was so unfavorable that it could carry out only loosely coordinated missions in conjunction with army operations, and these were of little concern to the German Air Force. Nevertheless, Russian commanders adhered to Stalin's directive with incredible stubbornness despite a continued massive attrition of their men and equipment at the front and by 1943 Stalin's aim had been largely achieved, even within the lower command echelons. [2] Opportunities for perfecting cooperative tactics were also sharply enhanced as the strength of the Luftwaffe and its ability to threaten Russian operations began to subside. By the end of the war, operations of the Russian infantry, armored, and artillery forces were generally integrated with the operations of Russian air support and tactical bomber organizations. [3]

When the German attack began in 1941 the Russian Army was about to reorganize its divisions, which it did after the opening of

hostilities. In order to provide greater mobility, the infantry divisions were reduced from 15,000 to 11,000 men in strength. Cooperative tactics were practiced between these new divisions and artillery units, but even in 1945 smooth coordination was seldom realized in Russian infantry-artillery operations. [4]

Victory of Tactical over Strategic Concepts of Airpower

From the outset, the Soviet high command adhered to the concept that the principal mission of airpower was for the support of army and naval operations, especially the former. German military planners did not expect strategic operations by the Russian Air Force, despite the construction of a number of heavy bombers in the Soviet Union prior to 22 June 1941. They pointed out that Russia lacked a sufficient number of these aircraft for serious strategic undertakings. [5]

Material considerations alone were not the only reasons for Soviet interest in close support air operations. Stalin himself envisioned military operations as primarily army functions, to be assisted as required by other arms and services. Thus there was no development of specific areas of main effort for the Russian Air Force as is generally found in strategic operations. Russian Air Force efforts coincided perfectly with the fortunes of the ground forces. Air divisions were assigned directly to the various armies and used within their respective areas. During the war there was one air army assigned to every army group sector and even at the highest command levels the air commanders were subordinate to the army. Although not all officers were pleased with this relationship, there could be no doubt that it was well tailored to Stalin's ideas of cooperative enterprise. Throughout the war about two-thirds of the entire Soviet Air Force was in the army air force, regularly employed in close air support operations. [6]

V. D. Sokolovsky, a well-known Soviet military authority, in discussing the military strategy of World War II, condemned the use of strategic airpower as frivolous and pointed out that "operations of the strategic aviation of the United States and Britain had no decisive significance in the victory over Germany." This is, in essence, the same view held by many Soviet military strategists, including Stalin. [7] Not only did they favor the use of tactical airpower, but the majority of their plans entailed close support type

operations. The Russian Army thus came to view airpower as the aerial counterpart of conventional artillery.[8]

Dive-bombing operations were grossly overemphasized and their importance overestimated by Germany's leaders, largely due to their experiences in Spain (1936-1939) and during the "Blitzkrieg" warfare in the West and in Poland (1939-1940).[9] These early Luftwaffe successes strongly influenced Soviet leaders, who also tended to think in terms of close air support.[10]

Russian dive bombers and bombers were nearly always employed either for air interdiction operations or for the bombardment of German bases close to the Soviet front lines. Little distinction was made by Russian leaders between air interdiction and tactical air support operations, all such missions being lumped together under the heading of "Support of Ground Forces."[11] Throughout the war, however, these operations, which normally entailed a consideration of weather and terrain conditions, were performed at altitudes too high for optimum results. They were also confined almost entirely to the front line area, seldom penetrating more than a few miles into enemy territory.[12]

In the spring of 1942 liaison officers were assigned to each Russian Air Army in order to coordinate all of its operations with the middle and lower echelons of command.

Adoption of German Tactics

Russian tactics tended to be systematic and fixed in character. In order to prevent deviations from the master plan, prior dispositions were made for most operations. These preparations were then supported in detail by all subordinate units, although the purpose of the entire operation was frequently known only by the highest staff personnel. Large air operations were rarely undertaken by the Russian Air Force. The gruppa, or group, consisting of about half a dozen aircraft, remained the standard combat unit throughout most of the war.[13] Russian flying units consistently sought to obtain local superiorities in men and materiel before the beginning of aerial operations, and sought to equalize conditions further by adopting a number of German tactics. The decision to accept the German concept of close air support was but one manifestation of this policy.[14]

The battles of 1941 were nearly disastrous for the Soviet Union, but they provided a hard school of instruction for its leaders. Alive to their many weaknesses, they were also deeply impressed by German ground and aerial successes. In the following year German pilots noted that Russian fighter pilots had learned to emulate Luftwaffe dispersed formation tactics in combat, and that they also had adopted the "wing man" idea for mutual fighter protection and better attack coordination. [15]

One of the most significant additions to Soviet Air Force operations was the implementation of the forward air direction team, modeled on the German pattern. Situated in or near the front lines, these teams maintained communication with Russian fighter and bomber aircraft and directed many of their attacks. Nevertheless, there were numerous instances of Soviet flyers selecting their own targets at random and even of some who attempted to mislead their ground observer and control units. [16]

The great interest in German tactics and equipment was noted in the regular efforts by the Soviet high command to secure German aircraft, especially the Me-109, Ju-87, and later the Fw-190. It also endeavored to make use of captured Luftwaffe pilots as instructors for the Red Air Force. [17]

Surprise as a Weapon

Russian commanders believed that surprise could be achieved if troop concentrations and movements, including both personnel and equipment, were adequately concealed. Two other prerequisites for effecting surprise were the deception of the enemy by diversionary action and by swift and clever execution of planned operations. Soviet leaders knew, however, that the importance of surprise as a weapon was temporary in character. They had learned this from war experiences in 1941, in which the effects of surprise, to which the greatest German successes owed so much, wore off and the situation became stabilized by more enduring principles. Surprise enabled the Russians, even in 1941, however, to gain an advantage over German units during large-scale operations involving local tactical actions, and even to exploit, albeit on a limited scale, the initial advantages resulting therefrom. At the same time Russian personnel became more aware of the necessity of constant vigilance to prevent surprises by the Germans and to prevent the successful completion of enemy

aerial reconnaissance and attack missions.[18]

As the war progressed, the periodical absences of German air units and an inadequate number of German reconnaissance missions at other times permitted Russian forces to set the stage for surprises against the German armed forces, some of which were to be decisive in character.[19]

The Problem of Inflexibility

Directly under the supervision of Joseph Stalin and immediately below him was the Stavka or supreme planning body, a staff of a dozen or more of the most highly qualified military officers in the Soviet Union. Although the Chief of the Army General Staff was invariably a member of this group, the entire army staff was always subordinate to the Stavka. Only among these members of the supreme board of strategy was there a full measure of freedom of thought and flexibility for military planning. No inferior staff enjoyed the privilege of making such sweeping changes in plans. In theory, flexibility and a large role in operational planning extended down through the commands of army groups, but the relative amount of freedom actually decreased in relation to the distance from the Stavka.[20]

Orders from higher officers or commands were accepted as "law" by lower commanders and troops. In the higher staff levels the precise objectives to be attained were defined, while minor objectives and modes of operations, and the means of securing them, were specified in great detail, even to the lower field commands. According to the 1940 Soviet Field Regulations, "The basic act of command is the making of a decision by the commander. . . . A decision must be activated firmly and without hesitation. . . . Any change of a decision when there are not adequately serious grounds for doing so is impermissible, and bears witness to an absence of a firm will in the commander."[21] Russian commanders, even of army groups, thus appeared to be passive, indecisive, and lacking in initiative and responsibility, all of which were reflections of a fear of deviating from the fixed plan as laid down by higher headquarters. This also made individual Russian units stubborn on the defensive, but absolute conformity to orders prevented them from countering German air and ground attacks in the most effective manner. This weakness found expression in all fields of Soviet operations, in concentration movements, in patterns of position, in the conduct of artillery fire, in logistical undertakings and in the employment of airpower.

German officers observed that new ideas, once formulated and given the force of orders by Russian commanders, were rigidly upheld as long as combat conditions would permit. Blind adherence to orders thus became the watchword of the Russian soldier. With utter disregard for impending air attacks, he persevered in his tasks, ceasing, if at all, only at the precise moment when his unit came under direct attack. Armored and elite (guards) units were more flexible in the conduct of their operations, but absolute obedience and unswerving devotion to the mission affected all air and ground organizations.

Field Marshal von Manstein describes a case of blind obedience which occurred in southern Russia in 1942. A determined squadron of Russian flyers, who had been ordered to destroy a bridge that had recently fallen into German hands, refused to abandon their objective despite an appalling German antiaircraft barrage and the presence of large numbers of German fighter planes. The Soviet pilots, attacking singly, approached their target again and again until 64 of their aircraft were shot down.[22]

Personal initiative was discouraged among Russian air and ground commanders by the pedantic precision and great security with which operations were prepared and executed. Thus bombers en route to a target, even when without protection, generally feared to change their course. The great Russian emphasis upon tight formation flying was another expression of the desire to impress conformity down to the lowest ranks. German fighter pilots were thus able to gain the upper hand over most enemy air groups.[23] The ever-present fear in the Russian high command that command staffs might be annihilated in the field or communications disrupted, made them even more insistent upon absolute conformity to the prearranged plan. The frequent consequence was that combat operations were out of harmony with the actual course of battle.

Chapter 4

CAMOUFLAGE

The Soviet high command laid unusually heavy emphasis upon concealment and secrecy in the armed forces. Camouflage measures were thus given a relatively high priority in military operational planning. The principal aim of such practices was, without question, to mislead the German Air Force and thereby the German Army as well. This great Russian concern for concealment is noted briefly in a statement made by Field Marshal Sir Alan Brooke to Stalin:

> You will remember that while talking about camouflage measures this morning, Prime Minister Churchill stated: "In wars the truth must surround itself with a bodyguard of lies!" You will also remember that you yourself told us that in all of your major offensives you concealed your intentions from the world. You have told us that your dummy tanks and aircraft are always massed in the front sectors apparently of current importance, while you hide your real intentions behind a cloak of absolute secrecy. [1]

German leaders soon noted the outstanding talent of Russian troops for the implementation of good camouflage techniques. The Supreme Command of the German Air Force attributed this to an innate Russian ability to sense the proper course of action. A Luftwaffe bulletin, which was widely disseminated, stated that, "Like most of the Slavic people, the Russian people also possess a natural manual ability, which is coupled with a natural property for concealment and improvisation." [2]

Natural camouflage entailed a use of the terrain, the particular types of vegetation at hand, and the prevailing weather and climatic conditions. Whenever possible Soviet troops, including airmen, took advantage of these factors. If necessary, however, they employed artificial means to fulfill their objectives. These included the application of camouflage paint, face masks, and camouflaged uniforms, as well as simulated structures and vegetation of all kinds. Smoke screens were also used to mask certain types of operations.

The Russian supply base at Kamysh-Burun.

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Soviet units and even individuals often worked out astonishingly simple and makeshift solutions to their concealment problems, sometimes combining both natural and artificial camouflage. A wide variety of readily available materials, including snow, trees, leaves, branches, stones, wood, cloth, and even buildings were used in the process.[3]

The Russian soldier was recognized by German commanders as the master of camouflage. Whatever the weather, the season, or the climate might be, he adapted himself remarkably well to his surroundings.[4]

Camouflage and Camouflage Discipline

Russian field regulations required a strict observance of camouflage discipline. All Soviet organizations were thus commanded to counter German Air Force activity by the fullest exploitation of natural and artificial camouflage, which was to be applied in a highly diversified manner so as to create the desired deception of the enemy. This discipline never flagged completely during the course of the war, although concealment practices were less faithfully observed during the closing stages of the conflict when Russia no longer feared Luftwaffe attacks in every combat sector.[5]

Attention to rules for cover and concealment decreased as distances from the front lines became greater. Far inland, supply columns and installations were poorly camouflaged, as was noted at the extensive supply base at Kamysh-Burun,* situated on the western coast of the Strait of Kerch, deep within Soviet territory and far removed from any conceivable combat area. Part of the reason for this breach of camouflage discipline might be attributed to a shortage of materials available to the local Russian commander.[6] Even with the best camouflage measures, desired results were not always achieved, but these techniques often provided the means for Russian troops to surprise the enemy, while they also gave a greater measure of security to Russian personnel.[7]

Men and Equipment

The Russians' strong affinity for nature helped them to excel in the arts of camouflage. Special materials provided for

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* See photograph No. 19, p. 35a.

camouflaging were almost nonexistent, yet Russian troops accomplished their concealment mission with great skill and effectiveness. Individual soldiers were frequently camouflaged in specially dyed suits, while Soviet reconnaissance patrols were often clad in "leaf suits," which provided nearly perfect concealment. German airmen were often unable to locate units which had already been virtually pinpointed by intelligence data. Such Russian troops appeared to have "vanished into the earth."[8]

Soviet military personnel were not generally subject to emotional reactions such as panic. They concealed their positions with great cunning and ability, sometimes requiring their troops in these sectors to remain motionless for long periods of time. Severe disciplinary measures were taken against Russian military personnel and even civilians who broke camouflage rules by moving about during unauthorized times, or who revealed themselves in other ways during enemy reconnaissance flights. Upon the approach of German aircraft all planned movements immediately ceased. Russian columns which happened to be on the road then usually dispersed into the surrounding terrain, sometimes in great confusion, but sometimes with great ingenuity. Troops concentrated in open terrain responded in a similar manner. Aerial attacks on such targets were therefore often fruitless. In the closing days of the war, troops of the Russian Army felt that they could safely disregard the threats of the German Air Force.[9] When the victorious Russian troops advanced into Germany in 1945, it appeared that they had abandoned all reasonable camouflage discipline and thought little about it. Their columns then appeared to be as dense as the German columns which advanced earlier upon Minsk and Smolensk.

German reconnaissance units operating in northern Russia in 1941 had much difficulty in locating entire regiments of Russian troops hiding in the Suwalki area.* These soldiers had camouflaged themselves and their equipment so cleverly, using twigs and leaves from the forests, that they avoided detection for a long time. Airmen of the German 4th Long Range Reconnaissance Squadron of the 14th Reconnaissance Group† were beset with similar problems. Flying

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* Editor's Note: A triangular-shaped area adjacent to and southeast of the former German province of East Prussia, now (since 1945) largely included in the northeastern corner of Poland.

† Editor's Note: This unit was then in support of the German Ninth Army, a part of Army Group Center.

from their base to Kalinin, Ivanovo, Moscow, and Vyasma, they failed to find any evidence of substantial Soviet forces, although the Third Russian Shock Army was then concentrating in that sector and attacked German positions shortly thereafter. In the following year, the same squadron carried out a number of reconnaissance missions in the area of Army Group Center. No trace could be found of troop concentrations in several villages, all of which were known to have been occupied by Russian forces. Activities in these habitations were severely restricted, chimneys were not smoking, nor were paths or tracks to be seen. The concealment was nearly perfect. [10]

Captain Herbert Pabst made the following notation in his unit war diary concerning air operations in the East during 1941:

> At least after their first disastrous experiment, and in some cases even from the very start of the campaign, the Russian ground forces were well camouflaged. They were so well concealed that they did not consider it necessary to cease combat activities even during an attack by dive-bombers. Russian vehicles, in particular, were well camouflaged. [11]

The Soviet Brigadier General Fomichenko points out that German reconnaissance planes operating near Kursk during the summer of 1943 failed to discover any sign of the enemy because of superb Russian camouflage measures. At that time about one-fourth of all the Russian troops to be used in the coming offensive were already in the area. [12] Often, when German air attacks indicated the discovery of Soviet troop locations, the Russians still maintained silence and camouflage discipline. [13]

Although concealment was the key to Soviet ground operations, circumstances sometimes forced them to abandon this policy. An example of this can be seen in the following description of a German liaison mission flown in 1942 near Kursk, over a village which was supposedly unoccupied by the enemy:

> During the 1942 offensive, Russian reserves in the Stary-Oskol* area were billeted in a number of villages.

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* Editor's Note: A settlement on the Seym River, about 70 miles southeast of Kursk and about 60 miles west-southwest of Voronezh.

> All personnel, the horses, and even the vehicles were moved into houses, barns, and earth cellars, or under hay racks, and were well camouflaged because of the air threat. Light antiaircraft guns had orders not to open fire and, like the troops in the villages, could not be recognized from the air. A liaison plane of the VIII Air Corps on a reconnaissance mission flew too far into the rear and crossed over one of the villages. At first all remained quiet and even from the low altitude at which the plane was flying, nothing suspicious was noticed. It was only when he sighted a few trenches which had not been very well camouflaged that the pilot decided to withdraw in a hurry. At that moment the village came to life. Antiaircraft guns opened fire and Russian soldiers emerged from the houses and commenced firing with submachine guns and rifles. To put it briefly, the village was swarming with Russian soldiers.[14]

The job of photo interpretation for German Air Force staffs was considerably complicated by Soviet camouflage. Sometimes the presence of Russian forces was not discovered until the beginning of a large attack.

Guns and Positions

Like Soviet infantrymen, Russian artillerymen were well trained and clever in camouflaging and protecting their equipment, thus hampering the effectiveness of German combat and reconnaissance missions. Whenever possible Russian artillery batteries bivouacked in forests or in other areas which offered good protection. If it became necessary to use isolated buildings or villages for cover, the artillery pieces were normally laid in the buildings themselves, often in peasant huts, while prime movers and other auxiliary equipment of the battery were hidden beneath special camouflaged covers which had been towed along for that purpose. Sometimes such equipment was covered to resemble straw stacks or outbuildings.[15] When gun positions were prepared in the open terrain, the earth thrown up in digging operations was carefully hidden, especially when such positions were prepared in assembly areas or at critical firing points. In order to add to the deception, dummy artillery positions were then prepared elsewhere, often in the near vicinity of the real battery guns. Alternate firing positions were also prepared in case of unexpected events such as German air attacks, accurate enemy counter-battery fire, or sudden changes in

the tactical or strategic mission. [16]

Artillery and antiaircraft artillery batteries situated in forest positions were carefully concealed with nets and generous amounts of natural vegetation. In defensive situations, camouflaged bunkers were sometimes constructed for men and guns. Russians hiding in a village north of Kharkov during April of 1943 concealed themselves in the already existing cellars and bunkers of the local populace, basements which were then rapidly enlarged to include office and dormitory space. [17]

Buildings and Depots

Large-scale construction measures were inaugurated at the beginning of the war to camouflage buildings and entire parts of cities, but were seldom seen again until the latter part of the conflict. Many examples were to be found of camouflaged buildings in all parts of the Eastern Front, but relatively few examples of camouflaging of whole city blocks were observed. Lavish and quite ingenious measures were taken to deceive German reconnaissance flyers in their operations over the Kremlin district of Moscow. Although these schemes were quickly executed, the speed was not sufficient to prevent positive identification of the capitol by German airmen, who saw the city during the various stages of camouflage construction.* In Moscow, damage from German attacks on 21 and 22 July 1941 was hastily obscured by the efforts of large numbers of Russian workers. Since subsequent German attacks on the city were carried out at night, the camouflage labors in Moscow were for naught. [18] An observer, who witnessed the early days of the war in Moscow, gives the following description of the camouflage measures implemented by the Soviet Union in its capital:

> The walls of the Kremlin were painted over to resemble a row of dwelling houses. Lenin's mausoleum of red and black marble in Red Square was covered with sandbags and decorated as a village house. Mozhavaya Street was painted over with zigzag lines to present from above the appearance of a row of house tops. The Bolshoi theater was draped with canvas on which false entrances were painted. The facade of the palace in the Kremlin was

* See photographs Nos. 20 and 21, p. 42a.

covered with netting decorated with green twigs. The five red stars usually illuminated on the highest towers of the Kremlin were hidden under cloaks of grey cloth. The golden domes of the Kremlin churches were boarded over with dark timber, and the brilliant green hue of the roofs of other large buildings was painted over with hideous blendings of blue and brown.

Never had I witnessed anything similar in times of war, neither in Spain nor in France. However, I was convinced that this camouflage could deceive nobody. In the case of ground combat, it might have served its purpose, but surely it could never in the slightest degree mislead German bombers flying high above the city and moreover dazzled by searchlights and the flames of exploding shells.[19]

Factories, especially those producing aircraft and other war equipment, were elaborately camouflaged. Transportation centers and traffic-direction installations were likewise covered by rather extensive camouflage constructions. Unit headquarters, command posts, supply depots, and similar installations were so carefully concealed that they could scarcely be discovered by German aerial reconnaissance. In locating their staffs, headquarters, and command posts, the Russians showed a preference for forest bunkers, small villages where cellars were used, isolated huts, and earth or leaf covered bunkers. These were well camouflaged and difficult to identify from the air. Movements around them were also limited to avoid detection during daylight hours.[20]

Headquarters personnel simply redoubled their concealment and security measures when accurate German bombing attacks indicated a probable enemy identification of their installations. An intelligence officer on the staff of the German VIII Air Corps in Russia cites an experience in which reconnaissance missions had utterly failed to reveal the presence of a Soviet command post which had been concealed with great care:

The Headquarters of the Commander-in-Chief, Central Area (Timoshenko) in August 1941 was located north of Vyazma* grouped around a summer villa in a thickly

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* Editor's Note: Vyazma is located west-southwest of Moscow, about 130 miles from the Soviet capital.

> wooded terrain. The villa was used primarily for conferences. The individual staff sections were in well-built earth bunkers widely dispersed around the villa at distances of up to several hundred yards apart. Some of the vehicles were protected against shell fragments by earth revetments, under a dense covering of foliage, and in addition were completely concealed by camouflage. Approach routes were barely discernible to observation from the air. A dive-bomber attack was launched, not on the basis of air photo interpretation, but because of prisoner of war statements. It was only after the first bombs struck the villa, in which an officer conference happened to be taking place, that the extent of the installation was revealed by the dispersing vehicles, horsemen, and military personnel on foot.[21]

Telephone and telegraph lines were carefully concealed, and radio stations were well hidden at considerable distances from the headquarters to which they were attached. Even when important Russian headquarters and other military installations had been positively located by German forces, it was generally impossible to detect changes at those bases from German reconnaissance missions.[22]

Airfields and Aircraft

When the Luftwaffe opened its attack on 22 June 1941, it found most of the combat aircraft of the Soviet Air Force standing in rows upon the many forward area fields, in typical peacetime formations.* In some instances it appeared that no efforts had been made to disperse or conceal such equipment. Lieutenant Colonel Horst von Riesen, of the German Fifth Air Fleet, describes a typical example of this unpreparedness in the northern sector of Russia during the winter campaigns of 1941-42:

> The Russian airfield Varlamo in the Murmansk area was attacked by our fighters of the Second Fighter Group, 30th Bomber Wing, at least a dozen times. Each time it was reoccupied [by the Russians] and sometimes even Martin bombers were stationed on it, although alternate airfields were available. The aircraft on the field were

* See photograph No. 22, p. 42b.

so poorly camouflaged that heavy damage was inflicted in each attack. The field was also unprotected by antiaircraft machine guns or artillery.[23]

Undetected airfields, such as the one located in the narrow Crimean isthmus near Perekop, caused immense difficulties for the German Air Force until they were discovered and destroyed. During the first days of the war, German air and ground personnel were surprised by enemy air attacks emanating from the hidden base near Lida, situated about 50 miles due south of Wilna. When it was finally located, small fragmentation bombs were sufficient to put the entire airfield and its aircraft out of action.[24*]

Russian troops soon learned to exploit every possible measure for the concealment of their bases. On permanent airfields, such as at Sevastopol, the arts of camouflage and deception were so well perfected that it was impossible for German flyers to determine whether the fields were actually occupied. Immediately before takeoffs, runways were rolled and sprinkled with water to keep down telltale dust. Planes sitting on the field were widely dispersed and carefully camouflaged. Sometimes new, fully camouflaged bases were constructed, leaving the older, better known bases as decoys. The Russian creation of false assembly points further confused the Germans. After 1941 Russian airfields and planes on the ground were no longer easily located and attacked. In winter Russian troops rolled the snowy runways to avoid the creation of snow clouds during landings and takeoffs.[25/]

Concentration Areas

German troops were frequently surprised at the speed with which Russian units could regroup or concentrate for new offensives. This was due, in large measure, to the great care taken in establishing and concealing concentration and regrouping areas. German airmen sighting a few Russian troops, sometimes one or two only, trooping along through the mud or snow often interpreted the movements as a mere handful of men en route to some unknown position. The appearance was innocent enough. In reality, however, these men were usually moving toward a concentration area. When such minute operations were considered collectively by taking a careful count, the

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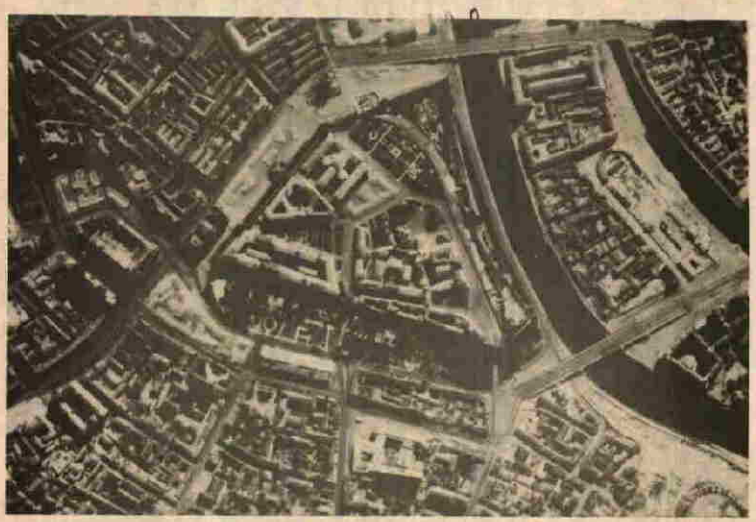
* See photograph No. 4, p. 7b.

/ See photograph No. 23, p. 42b.

An aerial view of the Kremlin district, Moscow, 1941, showing early stages of camouflage operations.



An aerial view of the Kremlin district, Moscow, 1941, showing later stages of camouflage operations.

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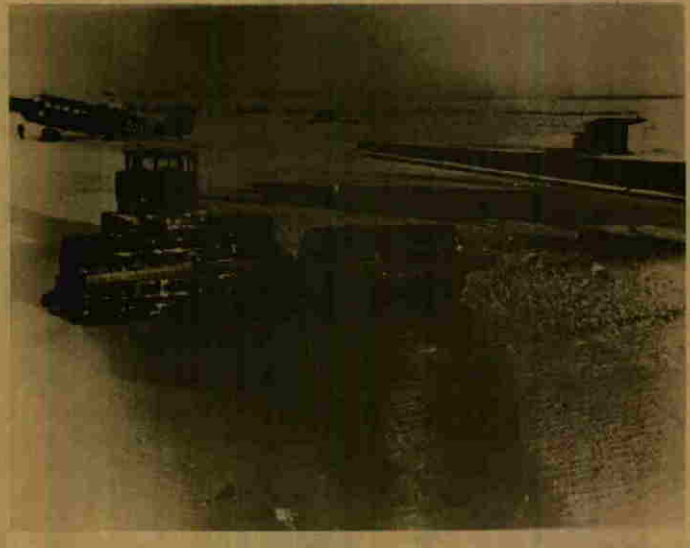
Soviet airplanes were easily destroyed as they stood in peacetime formation on their forward airfields, 1941.



Germans copy a Russian technique by rolling their snowy airfields.

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picture became alarming. Thousands of men were assembled in preparatory positions or moved in as reinforcements in this manner.

Once troops and equipment had arrived at a concentration or regrouping point, the most stringent concealment regulations were enforced by the Soviet commander. Forests were exploited to the fullest when possible, and all movement was kept at a minimum. Most personnel were obliged to remain out of sight during the day, and were prohibited from any unnecessary or revealing movements. Communications networks were also carefully guarded in such areas.[26]

Trains and Vehicles

Trains were camouflaged by the Russian forces with various types of paint, some colors intended to blend with ground colors, while white was used during the winter of 1941-42 to match the snow. Trains were also concealed behind hillsides, in narrow valleys, and in forested stretches of the line.[27]

The constant danger of German air attacks forced the Russians to camouflage trains loaded with armaments as carloads of produce. In some cases bales of straw were loaded onto railroad cars to conceal guns and armored equipment. Each tank was completely encased in straw to protect it from the eyes of the German Air Force.* Nevertheless, this ruse was often detected and the cars destroyed by incendiary gunfire.[28]

Like all Russian soldiers, those of the armored force were masters of deception and camouflage. From the opening of the war they tried to conceal the outlines of their vehicles to prevent aerial observation by the Germans. Russian tank officers were fully trained in the use of natural and artificial camouflage. No hard and fast rules were observed, and great latitude of action was accorded to the local commanders, upon whom rested the ultimate responsibility for cover, concealment, and security. Sometimes, especially in assembly areas, tanks were disguised as bushes, straw stacks, or, as was seen in 1944 in East Prussia, by sheaves of grain. Houses were also convenient places to conceal tanks if they could be reached before German pilots had sighted them. Villages were sometimes literally swarming with tanks, all of which were

* See photograph No. 24, p. 44a.

camouflaged until time for the attack. The outward appearance remained the same. The VIII Air Corps failed to detect anything significant from aerial photos of such communities. Their attack on the village was made only after prisoner of war statements indicated a secret tank concentration in that place. The tracks of armored vehicles were obscured from aerial observation by dragging trees behind the tanks. When these machines moved into shelters they were carefully hidden and all tread marks or tracks were dusted clean.[29]*

Russian tankmen often dug their tanks in when air raids were expected. The upper structure was then camouflaged, permitting only the gun to protrude. The soil thus served the double purpose of both cover and protection.[30]

Bridges

River crossings were circumspectly guarded and concealed by Russian Army Engineers. Landing sites as well as approaches to bridges were fully concealed. One of the most ingenious Soviet devices was the construction of numerous underwater bridges. These structures, built about a foot below the level of the streams, were used by all types of Russian units, yet they remained hidden from the view of the German Air Force.† To allay German suspicions which might be caused by turbulence in the water near the bridge sites, wreckage and other types of material were placed in the water upstream from the bridges to create a disturbance in the water. Generalleutnant Uebe mentions in his war diary a long underwater causeway, miles in length, which was laid by the Russians through the Sivash Sea, bordering the northern part of the Crimean Peninsula. This structure permitted Soviet commanders to transfer even armored equipment to the peninsula.

On another occasion the principal German Army units moving from Voronezh, 130 miles to the East of Kursk, down the Don to Korotoyak, were compelled to stop in order to destroy several bridges over which Russian forces were evacuating materiel. Although the VIII Air Corps succeeded in eliminating these bridges, massive amounts of heavy materials were conveyed across the river by the Soviet Army, using a cleverly camouflaged underwater bridge. The underwater bridge was not a new trick for the Russians, but German

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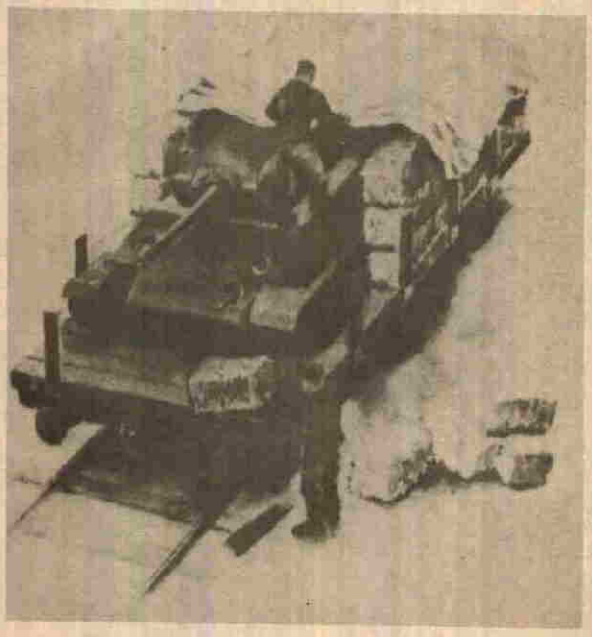
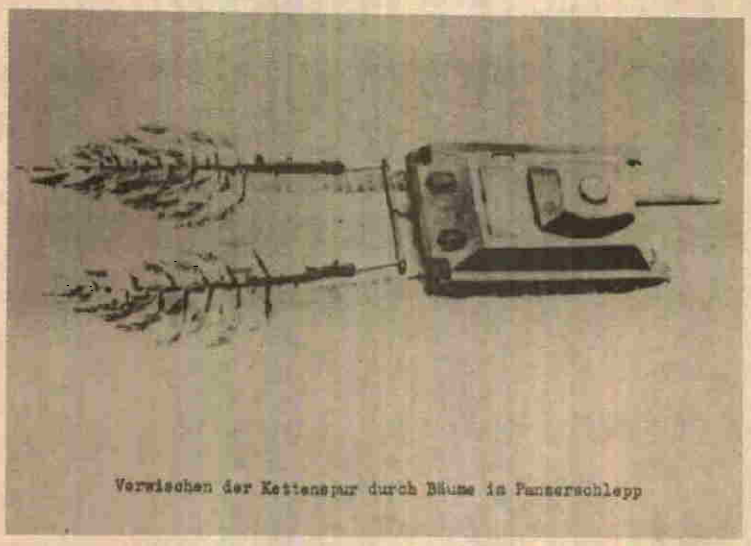
* See photograph No. 25, p. 44a.

† See photograph No. 26, p. 50a.



Russian tank camouflaged on a railroad car by bales of straw.



A Russian tank dragging trees to obscure traces of its tracks.

forces did not expect it, nor faithfully heed this invaluable device. [31]

Artillery Silence To Avoid Aerial Observation

During daylight hours Russian artillery continued to fire upon command, ceasing only upon the approach of German reconnaissance or combat planes. Firing batteries seldom shot any rounds after the first enemy bombs had fallen in their unit areas, in the hope that they would not be located by their muzzle flashes. Antiaircraft artillery units behaved in a similar manner, except that they opened fire upon all attacking combat aircraft. In assembly or concentration areas all artillery pieces remained silent to prevent a betrayal of their presence in the sector to the enemy air forces. [32]

General Deichmann* notes that antiaircraft guns in assembly and blacked-out settlements did not fire upon German reconnaissance planes. Even large settlements could be flown over in the night without provoking Russian artillery fire. Should their presence be detected, however, they opened up with all guns. [33]

Smoke Screens

The Russian armed forces occasionally exploited the use of smoke screens to cloak certain strategically important operations, such as river crossings or the openings of large offensive actions. In the summer of 1943 they used smoke screens to facilitate their crossing of the Donets River. At this time their techniques were insufficiently advanced, or inadequately executed, to insure a successful operation. As the war progressed, however, Russian leaders improved their skills in carrying out such operations. The well prepared river crossings over the Oder at Frankfurt and Kuestrin† were examples of this advancement. [34]

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* Editor's Note: General der Flieger Paul Deichmann, a veteran of both World Wars, as well as service in Spain (1936-39), is a recipient of the Knight's Cross and has held a number of eminent positions in the German Air Force, including that of Commanding General of the 1st Air Corps in the East. He was also Project Control Officer of the USAF Study Group at Karlsruhe, Germany.

† Editor's Note: Kuestrin is located about 40 miles east of Berlin and is now called Kostrzyn. Frankfurt an der Oder should not be confused with the better known Frankfurt am Main (in West Germany).

Colonel Rudel, flying over the key crossing point on the Prut River during the defensive fighting in 1944, observed the following:

> At the Skulyany* bridge, which was highly important for the movement of Russian supplies, smoke screening invariably began when we were still north of Iasi† on our approach flight, at a time when there were as yet no indications as to where we intended attacking. Every time I saw their smoke screens I had to laugh at the thought of the Russians sitting down there and staring up at the approaching dive bombers, which were not even headed for them. Naturally, the air in such cases was also full of radio traffic, and again and again we could catch the word Stuka! Stuka! Stuka![35]

According to General Deichmann and to General der Flieger Rudolph Meister, the Commanding General of the German IV Air Corps, the Russians also made ample use of smoke screens to conceal large static targets, railroad depots and sidings during clearing operations, and all large concentration areas.[36]

Darkness and Weather

Russian operations were immeasurably assisted by a widespread exploitation of darkness and weather conditions. Both of these elements served to conceal troop movements and concentrations, shipping and land transportation movements, evacuations, and other operations of tactical or strategic importance. Soviet ground forces were the first to make full use of these conditions in their planning, but the Soviet Air Force also tended to perform more missions at night and in adverse weather as the war progressed. Sometimes Soviet forces capitalized on both darkness and bad weather in the launching of massed ground attacks. The Germans, therefore, soon came to expect Russian logistical and combat missions during the most unlikely hours and during the most improbable weather.

Darkness. The earliest important use of night as a cover for large Russian operations was in the highly successful evacuation of

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* Editor's Note: Prior to 1940 it was the Rumanian city of Sculeni. The Prut River is now the boundary between the U.S.S.R. and Rumania.

† Editor's Note: Situated on a tributary of the Jijia River, about 15 miles south of Skulyany.

the Russian war industry from the combat radius of the German Air Force, an operation which was carried out in the summer of 1941. During this time Germany enjoyed a virtual air supremacy over much of European Russia. [37]

Generalleutnant Andreas Nielsen, Chief of Staff of the German Fifth Air Fleet in Norway and Finland, reports that the very heavy Allied shipping losses in arctic waters soon compelled all sea convoys bound for Russia to move at night and preferably during periods of bad weather. Most of the goods shipped to the Soviet Union over this route thus traveled during the winter months when seafaring was most hazardous. Coastal traffic was also hard hit by German air attacks and found daytime travel almost impossible. Allied coastal vessels thus rarely ventured forth except during the hours of darkness, and generally found shelter during daylight along the rugged coast line of the Kola Peninsula. [38] Maritime loading and unloading operations were likewise carried out at night so that the ships could arrive and depart in darkness. Russian military and civilian personnel were then made available in sufficient numbers to handle any unforeseen supply or loading problem, including also the repair of damage inflicted by German air attacks. [39]

Ships loaded with supplies from bases in the Caucasus were sent in 1943 for the support of the port of Tuapse.* They were dispatched so as not to arrive within the range of German aircraft until after sundown. Along the route they received some protection from antiaircraft batteries situated along the Black Sea coast. After unloading their cargoes onto lighters or other craft at sea, these vessels were then on their homeward course before dawn, again out of range of German aircraft. [40]

Because Soviet supply columns were such easy targets for German combat pilots in 1941, Russian commanders soon learned to avoid these undue losses by sending supplies at night in convoys of extended interval. Roads and byways thus generally appeared deserted to the German aerial observers flying over by day. Blackout procedures were also immediately put into effect with night movements, even though truck drivers did not follow these directives as well as did railroad crews. In the North, the bulk of the

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* Editor's Note: Tuapse is situated on the northeast coast of the Black Sea about 250 miles due east of Yalta.

logistical support for the beleaguered city of Leningrad was hauled by long truck convoys across the frozen expanses of Lake Ladoga. The movements of the convoys were timed for periods of darkness and unfavorable weather, when German aircraft were likely to be grounded.[41*] After 1943, when the power of the German Air Force began to decline appreciably, Russians dispatched their supplies by road during daylight hours, even when reconnaissance aircraft were flying above them.[42]

Railroad movements were also made during darkness in many cases, especially after the early successes of the Luftwaffe, which caused major disruptions of rail traffic in several places. Locomotive engineers, however, were sometimes like truck drivers in their disdain for proper blackout discipline, even when operating relatively close to the front. Sometimes Russian commanders preferred to play safe by detraining men and materiel as far as 50 miles behind the front lines.[43]

When Ju-87 "Stuka" dive bombers, which were regularly used as night fighters by the Luftwaffe, launched attacks against Soviet positions, Russian artillery units usually ceased firing to avoid detection by muzzle flashes, especially if the line of flight of the German planes seemed likely to pass over their emplacements. Some artillery units, however, continued to fire, banking on the usual relative ineffectiveness of German night raiders.[44] March orders almost invariably occurred at night so that new dugouts and positions could be completed and the guns properly laid or dug in by the first light of dawn.[45]

Troop movements were carried out during the hours of darkness to deceive German strategic air reconnaissance as well as for the protection of Russian soldiers. Large movements were often simulated during daylight hours in a false direction. As soon as night fell, the real movement got underway in the intended direction.[46] Russian troops were frequently sighted by German flyers, however, who observed the lights from their cigarettes, the burning tips of which betrayed their columns to the enemy operating as high as 2,500 feet above them. Russian soldiers seemed unable to suppress their craving for the sake of blackout discipline.[47] German flyers operating in the Caucasus area during 1941 and 1942 noted the dearth of activity in Russian rear areas in the daytime in contrast to German

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* See photograph No. 27, p. 50a.

rear areas which were alive with troop movements. Since they moved at night and hid by day the Luftwaffe was frequently frustrated:

> . . . Here, where we could have operated against the Russians in the Oradea-Czegled-Debrecan area, they moved the bulk of their forces with great speed and almost always at night. During daylight they remained stationary and well camouflaged in the wooded sections or cornfields near the roads, or they concealed themselves from air observation in settlements. For this reason actual bombing or strafing was of secondary importance during our attacks. The first thing to do was just to find the Russians.[48]

Concentration and regrouping movements were made almost entirely at night after the directive issued in June of 1942 by the Russian Deputy People's Commissar for Defense, Major General Fedorenko. Such actions were to be effected by very small units and groups of not more than five tanks at a time. Railroads were used if possible, but if such lines were threatened by German Air Force attacks, movements were made directly across country.[49]

As early as the late summer of 1941, Russians tried to reduce the effectiveness of enemy daylight attacks by bombing German airfields at night. Areas in which forward navigational and locating devices were located were carefully avoided, since it was well known that they directed German night fighters. Defensive action was hampered for the Germans by the Soviet practice of approaching with motors cut out. Once the bombs had been jettisoned, the Russian flyers then started their engines and fled at top speed. Without question these raids were an annoyance to the Germans.[50]

The Russian logistical support for their partisan bands was largely carried out by Soviet flyers, operating low-speed, maneuverable aircraft, especially the U-2.* These missions

*Editor's Note: The U-2 was a single-engine ambulance and training aircraft, while the R-5 was a single-engine reconnaissance plane. The U-2 had a top speed of only 94 miles per hour, but it could land in rather small, cleared areas in forested terrain. See USAF Study 177 (photograph), p. 55.

were carried out at night at low altitudes, sometimes by the expedient of air drops. Even personnel were quickly landed, sometimes without parachutes, if the snow was of sufficient depth. A number of areas were favorite centers for partisan activity, among them the great forests near Leningrad, and the massive complex in the sector of Army Group Center, roughly bounded by lines drawn from Orel to Vitebsk to Brest-Litovsk.* Germans seldom knew the whereabouts of partisans or their plans. Low-flying Russian pilots were exremely difficult to follow as they clung to the natural terrain features. They used few light signals in demarking their drop zones, and Germans only rarely discovered them or intercepted goods destined for Russian forces.[51]

Partial airlifts were used at night by the Russians to evade German Air Force fighters and to supply such cities as Leningrad and Stalingrad. For this purpose they used Douglas A-20, U-2, and R-5 aircraft as well as TB-3s.[52]

Weather. Adversities and inequities in weather conditions were quickly used by Russian forces to their own advantage. In 1941 German reconnaissance flyers found Russian airplanes standing on their airfields in peacetime order. This tactical slip was hastily corrected, however. During an ensuing two weeks of inclement weather, the remainder of the Soviet Air Force planes were camouflaged or hidden from view and all aircraft were widely dispersed.[53] Russians soon carried out transport and supply movements only during bad weather when the Luftwaffe was not in the air. Generaloberst Heinz Guderian describes an incident which occurred on 10 September 1941 in the central sector, typical of Russian ingenuity in making good use of local weather conditions to offset their aviation deficiencies. The German airfields, as the Russians knew, were located in an area which was then experiencing some especially bad weather, while the Soviet airfields, although not far distant, were in a clear weather zone. The Russians took advantage of the inability of the enemy to oppose them to attack the Seym River bridge and vicinity.[54]

An interesting example of Russian deception by weather factors is shown in the report of Generalmajor Hans-Detleft Herhudt von Rohden,† concerning a reconnaissance mission made during

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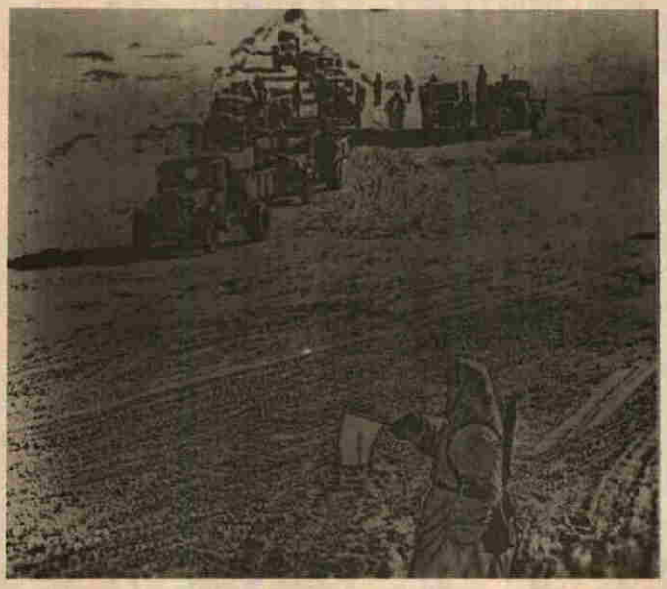
* See Map No. 10, p. 26b.

† Editor's Note: Generalmajor Hans-Detleft Herhudt von Rohden, former Chief of the Military Science Branch (8th) of the German Air Force.

A Russian underwater bridge.



A Russian supply column crossing
the frozen waters of Lake Ladoga.

the Russian preparations for the Battle of Stalingrad:

> A Ju-88 unit was on a strategic reconnaissance mission over railroads north of the Don River bend, returning southward from Tambov. The low cloud ceiling was almost unbroken. Flying at low level the plane broke through the cloud cover. At an altitude of 165 feet, cloud wisps streaked by, but the ground was visible. Like long phantom fingers, tracer shells suddenly reached out for the Ju. On the wide southward road the observer noticed widely spaced dark groupments, in between them massive shapes; tanks! The same picture presented itself everywhere. The weather was as bad as could be and wherever visibility was less obscured reconnaissance observers for weeks past had found the same picture. This applied also to the Fw-189 tactical reconnaissance units. What was happening could only be conjectured. In the minds of experienced crew members, of command staff personnel, and of the squadron leaders, however, there was no room for doubt. Secretly, and cleverly, under cover of bad weather, the Russians were concentrating forces here north of the Don River bend.[55]

When the Soviet Army began its massive assault upon Nizhne-Chirskaya* on 19 November 1942, the low overcast and drifting snow virtually masked the uneven steppe area. With the help of very poor visibility the Russians succeeded in opening their offensive at a time when the German Air Force was obliged to remain on the ground.[56]

When good flying conditions were evident the Russian rear areas became deserted and Russian air units were seldom seen. Soviet airmen preferred to take chances with the visibility rather than with German fighters during most of the war.[57]

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* Editor's Note: Nizhne-Chirskaya, sometimes called Chir, is located about 27 miles southwest of Stalingrad. Its capture was essential to the ultimate success of Russian offensives in the Stalingrad area.

Chapter 5

DECEPTION

The Russians used deception extensively and effectively in order to mislead the Germans and to help Soviet forces to achieve surprise over the enemy. Active deception normally took the form of supplying false information to the enemy by one means or another, while passive deception concerned the security measures taken or about to be taken by Russian troop units. A Soviet study, entitled Deception, describes this aspect of military activity:

> Deception of the enemy is achieved through the concealment of existing targets from enemy observation and the construction of dummy objectives which will divert the enemy in a desired direction. It is thus necessary to proceed in conformance with the ancient principle of similantur quae non sunt, quae sunt vero dissimulantur (that which is not present is to be simulated, that which is actually present is to be concealed). [1]

Army headquarters staffs were basically responsible for planning and implementing such measures, while special construction units were made available for the accomplishment of technically difficult tasks.

Impact of the Russo-Finnish War of 1939-40

The initial Russian use of deception misled the German high command with respect to Soviet strength in operational aircraft. Records in the war diary of the Second Air Fleet show that Germans believed, until after the outbreak of war in June of 1941, that Russia had no ready aircraft reserves. Within a month this view was proven to be false. Despite the huge numbers of aircraft shot down in the air and destroyed on the ground by the German Air Force, the resulting decline in number of Soviet operational planes was less than was expected. [2]

Generalleutnant Josef "Beppo" Schmid,* a well-known Luftwaffe officer and former Chief of the Eastern Intelligence Branch of the German Air Force, suggests that the Soviet Union deliberately attempted, even as early as 1939, to mislead Germany and the world with respect to the Russian military potential. This view is shown in the official reports of the Eastern Intelligence Branch of the German Air Force, reports probably reflecting the thoughts of its Chief:

> Numerous reports were received on the Russo-Finnish War dealing with the tactics, technical standards, and strength of the Russian Air Force. What became known about this winter war did much to bring about a general underestimation of the Russian armed forces, including the air force. It is not impossible to assume that the Russians fully intended to give the world a false impression. [3]

Some German Air Force officers, including Generalleutnant Uebe, have expressed doubts about this idea on the ground that the risks for Russia in resorting to deception of this sort would have been too great at a time when the Soviet Union desperately sought certain strategic objectives in the North. Uebe declares that even the well-known Russian indifference to human losses in battle would not sufficiently explain or justify such deception. [4]

Dummy Structures and Positions

Clever improvisations were made by the Russians in order to deceive the enemy, especially the German Air Force. Russian troops fabricated all kinds of artificial structures to give observers an entirely false impression of the character or size of Soviet positions. Many of these dummy constructions were portable, permitting them to be used again and again in different situations.

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* Editor's Note: Generalleutnant Schmid entered German military service with a Freikorps unit in 1919 and subsequently served in many capacities as an Infantry and Air Force officer. With the Air Force since 1935, he also served as commander of the Parachute Division (reinforced regiment) "Hermann Goering" in Tunisia in 1942-43. He is best known, however, as an intelligence staff officer.

Arms and Equipment

Conventional and antiaircraft artillery pieces were constructed from wood or other available materials and placed in position to draw attacks by German Air Force units or to give Germans the impression that certain areas were strongly defended. Dummy artillery was also extensively used to divert attention from real firing batteries which were then in action or preparing for action. Once dummy positions had been properly identified by German observers, the Russians often substituted real artillery pieces for the artificial guns, permitting their crews, if they followed reasonable camouflage precautions, to fire for a time without being located by the Germans.

Dummy tanks were fabricated in large numbers in order to draw attacks from the German Air Force. Frameworks of several kinds were used, usually covered with cloth, but also with wood siding or other suitable materials, and painted to resemble armored vehicles such as the T-34.* Tanks were also constructed of earth, snow, and logs.† Tank crews did not normally have adequate training in the arts of cover and concealment, but their officers had been carefully schooled in this respect and directed all such projects with energy and ability.[5] Sometimes tanks were draped with canvases to resemble trucks, while on at least one occasion, a German antitank squadron attacked a large number of Russian tractors, camouflaged as tanks, sitting in the marshaling yards at Smolensk.[6]

Buildings

In open terrain, where no forests or villages were present to offer concealment, the Russians often constructed dummy hayricks, sheds, or even cottages. These structures were movable, so that they could be used in other areas, or could be extended in a telescope fashion to shelter planes and other large items of equipment.†† Dummy buildings were also situated near actual village houses to provide cover for equipment used by troops hiding

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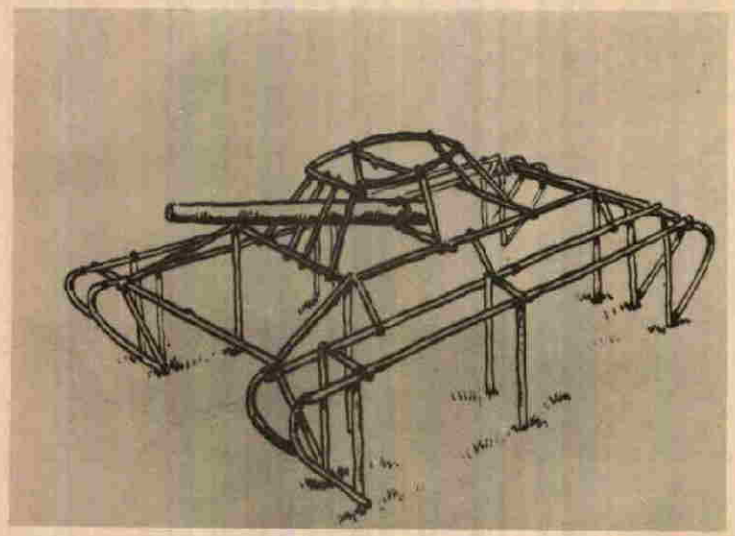
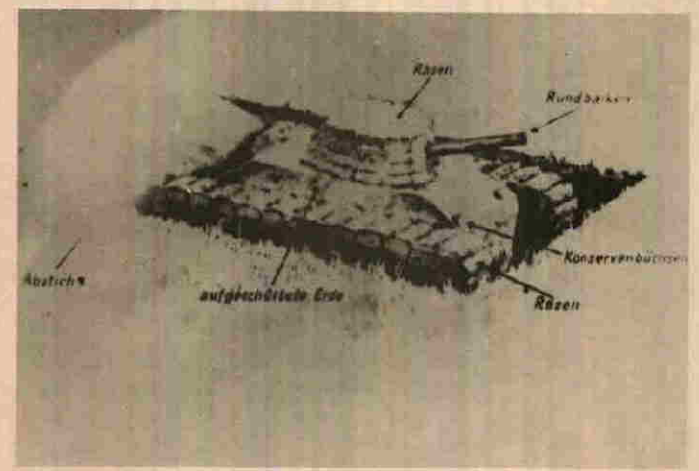
* Editor's Note: The T-34 was one of Russia's most effective WW II tanks. Its loose tracks and rugged construction permitted it to traverse many types of adverse terrain. Germans rated this vehicle as first class.

† See photographs Nos. 28 and 29, p. 54a and No. 30, p. 54b.

†† See photograph No. 31, p. 54b.



A Soviet framework for constructing dummy tanks.



A Russian dummy tank (type T-34) constructed of earth.

A Russian dummy tank constructed of wood and canvas.

A telescopic aircraft hangar disguised as a house.

in the village itself.

Headquarters structures and supply depots were also fabricated to mislead German aviators and cause a futile commitment of enemy airpower upon those points.[7]

Trenches and Positions

Dummy troop positions and trenches were constructed by the Russians in a number of places. In the summer of 1943, during the Soviet preparations for a heavy counteroffensive near Kursk, they deceived the Germans regarding their location by constructing 1,500 dummy trenches, battery positions, and observation posts. The Russian commander also established three large assembly areas, all of them false.[8]

As was the case with artillery batteries, the Russians often transferred combat units into trenches and troop positions which had long been recognized as dummy positions. Artificial emplacements were so well simulated that German reconnaissance and combat flyers could scarcely tell them from the genuine positions. Sometimes the Germans did not discover their errors until after the particular area had been captured.[9]

Communication Routes and Bridges

Roads were simulated to deceive the Germans about Russian intentions or to divert their attention from actual routes of communication. Strategic railroad lines were sometimes carefully camouflaged at critical places, while dummy lines were established nearby to divert attention and to draw German air attacks.

In some instances, Russian troops built dummy bridges and simulated approaches to invite enemy attacks and to mislead the enemy with respect to the true river crossing point.[10] Tracks with planks placed between them were set up over frozen bodies of water in order to simulate bridges. If German airmen attacked these "bridges," the Soviet supply columns simply drove around the bomb craters. The same trick was then constructed a short distance away. Experienced German pilots, recognizing the frequency of such deceptions, objected to bombing any point or bridge not positively identified as a part of the Russian traffic operation. Having seen such tricks on the Don, the Donets, and numerous other rivers, they were well aware of the futility of attacking

dummy bridges and, at the same time, of the dangers which could result from failure to recognize and destroy actual bridges. [11]

Airfields and Aircraft

Artificial aircraft were constructed in mass to be used at a number of actual or dummy airfield installations. Sometimes these were fabricated entirely of materials procured in the vicinity of the fields.* Service personnel were then directed to move the carefully painted dummy planes and vehicles about the field to maintain the deception for German air reconnaissance. [12]

When enemy observers became aware of the ruse, the Russians then often replaced the dummy planes with real combat aircraft. When dawn arrived the appearance was the same, but the dummy airfield had now become a real air base. [13]

Simulation and Dissimulation of Damage

Orders were issued in the Russian rail transportation service, directing all units to simulate bomb damage or gunfire damage whenever German planes attacked. This was to be effected early in the attack in order to persuade German airmen to desist from further action on the presumption that their objectives had already been achieved. Colonel Hornig, Operations Officer of the German Sixth Air Fleet, mentions Russian railroad engineers' attempts to escape further damage to their trains by blowing steam from the locomotive boilers, simulating bullet or bomb fragment perforation. These engineers frequently became overzealous in the use of this trick by releasing the steam before any aircraft missiles had had time to strike the train. This escaping steam idea, which was first observed during the winter of 1941-42, proved eventually to be rather ineffective. [14] German railroad engineers advised Luftwaffe pilots not to attack the locomotive boilers, but to concentrate upon destroying the cast steel cylinders of the Soviet machines, which were virtually irreplaceable. Nevertheless Russians continued to react in the old manner, blowing off steam at the first sign of the German Air Force. [15]

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* Editor's Note: A number of dummy airfields were prepared by the Russians behind the Parpach line, a defensive position across the neck of the Kerch Peninsula.

Sometimes damages were carefully concealed to mislead German reconnaissance units with respect to the success of previous air attacks. Typical of such deception is the case reported in the Far North in 1941 by Colonel von Riesen:

> In an attack by the Second Group, 30th Bomber Wing, on a power station roughly 16 miles northwest of Kandalaksha,* more than 2,000 tons of explosive bombs, . . . were dropped on the target area, roughly 200 yards square. According to the unmistakable observations of the air crews, 80 to 90 percent of the bombs landed in the target area. Because of weather conditions, five days passed before long-distance reconnaissance planes could photograph the results. Astonishingly, air photos showed bomb craters only along the extreme edge of the target area and no signs of destruction whatever within the area itself. A close examination of the photos revealed that the Russians had carefully concealed all damage in the past five days. [16]

Russian tanks in combat were almost invariably compelled to dispense with normal camouflage discipline. They then operated in dispersed formations, using what evasive maneuvers they could, or, failing in this, they simulated damage by the use of small fires, smoke bombs, or special incendiary devices.† Experienced German pilots soon learned, however, to distinguish between simulated damage and real damage by noting the manner of the explosions and the color of the ensuing flames. [17]

Reports from all sectors of the Eastern Front attest to the Soviet practice of lighting fires and releasing smoke bombs near gun positions, depots, headquarters, and supply installations immediately after a German air attack. Russian troops were also billeted outside whenever weather conditions permitted in order to avoid casualties. [18]

Fighter pilots of the Russian Air Force soon began to resort to a number of devices to deceive their German opponents. When pursued by enemy aircraft Soviet airmen used special

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* Editor's Note: Situated near the western point of Kandalaksha Bay, just south of the Kola Peninsula.

† See photograph No. 32, p. 66a.

incendiary attachments and released smoke bombs to simulate damage. At the same time they threw their planes into awkward, seemingly uncontrolled spirals, to complete the picture of destruction. If successful, they then tried to escape at tree-top level.[19]

Captured Equipment

Rumors were frequently cast about by German troops regarding Russian use of captured German airplanes. Employment of German aircraft by Soviet flyers was probably made only in unusual circumstances or in the support of partisan operations.[20] Capt. Volker Reschke, the commander of a German tactical reconnaissance squadron and later of a group, reported an incident in which one of his own squadron aircraft, in sight of a German divisional headquarters, was fired upon by Wehrmacht ground personnel! These troops, then under heavy Russian artillery fire, alleged that it was due to the "enemy" Henschel observer flying above them. This rumor was not corrected until Reschke succeeded in convincing the division commander that the "enemy" plane was really one of their own.[21]

Perhaps one of the most clever ideas used to mislead German Army and Air Force personnel was the widespread wearing of German uniforms by Russian troops. Entire units were issued regulation German uniforms, sometimes stripped from captured German troops prior to their liquidation. This type of ruse was most successful, especially in view of the fact that soldiers of Soviet origin fighting in the Vlassov Army were also clad, despite Hitler's forebodings, in German uniforms.[22]

In the summer of 1943, an instance was recorded in which the use of German uniforms and the spoken language were instrumental in assisting the enemy to enter critical areas within German military establishments:

> . . . a German-speaking Russian in the uniform of a German officer succeeded in driving a German truck right up to headquarters of the Rovne military government detachment (Ortskommandantur), and in obtaining an audience with the commandant, a general. He gagged the commandant, wrapped him in a large rug, carried him out to the truck which he had left idling outside, and delivered him to the partisans. Only by the simple words,

> "Thanks, comrade" - words that an officer in the German Army simply would not use in addressing a private -- did he arouse the suspicion of the kidnapped officer's orderly, who had innocently helped him load the heavy carpet into the truck.[23]

Whenever German armored equipment or artillery could be acquired, it was used by Soviet forces against their enemies' positions. It was not unusual for Germans to see one of their damaged tanks, which they had not immediately recovered and brought back within their lines, coming against them in the ranks of the opposition a day or two later, sometimes painted with Soviet insignia, but very often still bearing the German cross.

Use of German Recognition Signals

One of the most clever and useful reactions against German airpower was the widespread adoption of German recognition signals and troop behavior patterns to mislead German pilots. In many cases Swastika flags were issued to Russian units, or, in some instances, cloth panels of red and white material, colored smoke signals, or other pyrotechnical equipment items were dispensed.

Infantrymen were especially likely to use this means of deception, preferring smoke signals to flags. They also learned quickly to wave to the German aircraft, just as German troops were accustomed to doing. Some of the Russian troops also fired Very lights of red and white color. Thus many a German pilot became convinced that he was flying over his own forces.[24]

Diversionary Marches and Movements

Preparations for concentrations and offensives were completed with great skill. Russian units designated for action were first assembled behind an area in which no combat was intended, and then were moved at the latest possible moment before the attack to the new and proper location. Sometimes diversionary attacks were launched from the false assembly points to further mislead the enemy. All such movements were carefully coordinated with the local army headquarters. The final movements

into jump-off positions were often carried out at night.[25] Simulated concentrations and massing of equipment made the tasks of the German reconnaissance units doubly difficult, and the failure to recognize an influx of combat troops into dummy positions had serious results.[26]

In the winter of 1942, when Soviet forces were being built up in the sector between the Don and Volga Rivers, preparatory to the Stalingrad offensive, the entire operation was effected at night, moving in a few men by infiltration, until a massive group was concentrated there. Colonel Jaehne, then with the VIII Air Corps, attributed the subsequent Soviet successes to this clever concentration movement. The Germans, indeed, expected an attack, but from the area of Kotluban, near the Don-Volga Canal, just to the southwest of Stalingrad. An attack did come from south of the city, but the main effort was launched from Kletskaya, about 75 miles northwest of Stalingrad, on the Don. This operation was the key to the encirclement of the German Sixth Army.[27]

A final piece of confusion was added by the Russian practice of opening their offensives on an extremely broad front, keeping the center of principal effort in doubt until the crucial moment for the blow.[28]

In seaports and river harbors, Russians frequently changed the positions of their ships to prevent a positive association of important vessels with specific berthing areas. When putting to sea, Soviet and Allied vessels often departed in a false direction to mislead German observers. When night fell the ships changed to the correct courses and passed out of range of German planes or completed their runs to their destinations.[29]

Diversionary Flights

The early victories of the German Air Force in Russia made a heavy impression upon the morale in the Soviet Air Force. Indeed, the Russians in general remained apprehensive of German fighters throughout the war, long after the Soviet Union had established clear numerical superiorities in aircraft and flying personnel. In accordance with their tactical principles, Russian fighters often engaged in battles of containment against German fighters in a given sector, in order to allow Soviet light and medium bombers to accomplish their missions elsewhere.[30]

Russian flyers expected strong opposition from the Germans in the air, and attempted to reach their attack objectives by approaching from improbable directions. If they could achieve surprise over the Germans they stood a better chance of completing their assignments. Soviet bombing planes therefore often began their operations by flying in great arcs to deceive German observers and, what was of more immediate importance, Luftwaffe interceptors. Targets were then approached from the German rear. Even in April of 1945, Soviet pilots attacking German Army units near Fischhausen, Pillau, and Neutief,* followed this principle, being still leery of the few German Air Force interceptors which were then operational.[31]

Similar deceptive tactics were used by the Russians in the coastal areas of the Soviet Union, where enemy objectives were approached after long, sweeping flights over the sea. These methods usually permitted Russian air crews to arrive over their target areas without incident, although they were often unable to get back to their bases.[32]

German Air Force Intelligence personnel discovered that Russians concealed their supply operations by assigning diversionary bombing missions to partisan supply aircraft (usually U-2 or R-5 planes with speeds of about 100 miles per hour). These apparently "primary" missions diverted German attention from the real Soviet objectives, which were the supplying of arms, ammunition, and other essential materials to the many partisan bands. The supplies were air-dropped to the waiting partisans upon either the approach or the return legs of these bombing missions.[33]

Germans used airlift operations to deceive the Russians. German forces at the Kantimirovka airfield/ had made use of the cover of darkness for several weeks to fly in reinforcements and supplies. When their position became untenable, the Luftwaffe commander at the field decided to operate the airlift in reverse. Russian observers assumed, this time incorrectly, that flights

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* Editor's Note: These communities are all located in the former German province of East Prussia near the Frisches Haff. Fischhausen is called Pimorsk, while Pillau is called Baltisk as communities in this recently created extension of the Russian S.S.R.

/ Editor's Note: This base is situated in the Ukraine, near Poltava.

into the field after 17 January 1943 were merely additional movements of troops, food, and equipment for the encircled units. Thus the Germans avoided almost certain capture and succeeded in withdrawing more than 1,900 men and some items of equipment. [34]

Supplying False Information to the Enemy

A masterpiece of Russian deception was the plan by which falsified maps of the area north of Moscow were played into the hands of the German Intelligence Service long before the outbreak of war. According to a strategic reconnaissance officer of the Luftwaffe, Colonel Jaehne:

> The maps reproduced by the Germans for the areas east of the Kalinin-Moscow railroad are completely wrong and a product of imagination. At any rate it was impossible to locate targets by them. Only the obvious terrain features, such as the Volga River and the railroads to Moscow, were correctly entered. During the initial stages, these falsifications afforded the Russians protection against the precise approach of German aircraft to targets. [35]

Omissions on captured enemy maps were not always attempts to deceive the Germans, as Emil Heller, Chief of the German Mapping, Survey, and Cartography Center of Army Group Center, has testified, and as subsequent German experience showed. The German high command assumed that any map was necessarily obsolete at the time of issue, because of the length of time required for the drafting, production, printing, and dissemination of maps. Many German leaders believed that the same conditions prevailed in Russia as in Germany before the war with respect to the printing of maps. In Germany prior to 1939, maps were not permitted to show military installations, unless they were prepared for special military staff uses. The only valuable maps from the German point of view were, therefore, the latest, secret editions which were disseminated by Russian commanders only by serial number and by signature of responsible officers. Knowledge of this tight Soviet security, however, tended to increase German confidence in wartime Russian maps, some of which were deliberately falsified for enemy acquisition. [36]

False information imparted by Soviet forces exerted a powerful effect upon German Air Force personnel, especially during critical periods. A story, alleging that a large number of Russian paratroopers were preparing to seize the base, was told by an interrogated Russian prisoner at the Oblivskaya airfield.* The story soon spread throughout the entire installation. Although no such invasion materialized, all units at the field were compelled to remain on the alert for several nights, during which time personnel had to sleep fully clothed, ready for any eventuality. [37]

Sometimes false information was spread by Soviet agents sent into German territory, while in cases where Russian units were about to be captured, troops were deliberately told erroneous stories by their officers on the assumption that under interrogation they would repeat them to the Germans. Soviet commanders believed that such information would seem more credible to the enemy if Russian soldiers thought it to be the truth. [38]

Attempts were also made to misdirect German airmen by false radio broadcasts in the German language. These acts of deception, although done in excellent German, were always detected by Luftwaffe personnel. The following report is an example of one of these Russian transmissions:

> Frequently the Russians screamed wildly into the radio with the intention of interfering with our communications; often they endeavored to transmit to us new targets for attack while we were in flight. The new targets were naturally within the German lines. Although the orders were transmitted in good German, we soon discovered the trick. Very often a message would come over the radio: "Don't attack the assigned target; the troops are our own." In reality, the troops were Russian. [39]

Thanks to a much sounder radio discipline and the use of large numbers of Baltic- and Russian-speaking personnel, the German Air Force was more successful in confusing the Soviet forces with native language transmissions than the Soviets were in deceiving the Germans. [40]

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* Editor's Note: Oblivskaya is located about 90 miles due west of Stalingrad.

Ferrying Operations Using Deception

Russian ferrying operations always presented a dilemma for the German Air Force, since, unless such movements were stopped, it became almost impossible to halt the steady trickle of men and materiel which flowed across Russian water bodies, enabling the Soviets to amass huge superiorities. The Luftwaffe stood the best chance of discovering and checking these operations, but clever Russian improvisations made detection extremely difficult. Colonel Jaehne discovered that Russian forces had learned to conceal a large ferrying operation across the Volga during the Stalingrad fighting. Although German officers suspected that the Russians used tractors to tow all of the ferry gear ashore when not in use, conclusive evidence to verify this idea was never found. The Russian forces thereby brought what had earlier been a successful air interdiction operation to a halt and prevented further German air interference at those points.[41]

A special type of water transportation method was observed in the battle for the Kuban bridgehead, the eastern approach to the Kerch Peninsula, in 1944. The following description was made by Colonel Rudel, a noted German dive-bomber pilot:

> The Russians were employing a new method to disguise and protect their movements against German reconnaissance, and to reduce the effects of German air attacks. Air reconnaissance had identified the concentration of large numbers of boats in the ports of Yeysk and Primorsko-Akhtarskaya.* The concentrations were under attack by dive-bombers, but the targets were so small and the boats so numerous that the attacks had very little effect. The Russians continued moving in large masses by day and night through the innumerable lakes, canals, and lagoons and in this way gradually worked forward to Temryuk/ and to the rear of our Kuban front, a distance of about 30 miles. They paused for rest in the high reeds or on islands. Here they concealed themselves very cleverly

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* Editor's Note: Yeysk is located on a promontory jutting out between Yeyekiy Lake and the Bay of Taganrogsk in the Crimea. Primorsko-Akhtarskaya is located at the mouth of Lake Akhtarsk at the Sea of Azov. The capture of these points made the retention of the Kerch Peninsula impossible.

/ Editor's Note: Temryuk, about five miles from the southeastern corner of the Sea of Azov, was vital to the German defense.

and were exceedingly hard to find. They were exposed to our attacks only while moving across open waters.[42]

Russian troops resorted to the use of ponton ferries from primitive landing stages during daylight hours. During the Demyansk battle of encirclement, 21 March 1942 to 9 June 1942, these pontons were used in bridging the Lovat River. The ponton ferries were taken out of concealment during the night and placed in position.[43*]

Generalleutnant Uebe, Chief of Staff of the VIII Air Corps, was long puzzled by photographs brought to him by reconnaissance pilots showing the Volga River between Astrakhan and Kuzlyar, where Russians were constructing a strategically important railroad line. No conventional railroad ferry or trestle could be seen from the photographs, and the Volga was more than a half mile in width at that point. Actually, railroad ferry operations were then in full progress.

In order to conceal these more or less continuous operations, the Russians had laid tracks across the decks of ordinary river vessels, loading and unloading the rolling stock from the sides of the boats, rather than from the ends. Since they carried out such undertakings only during bad weather or darkness, their operations escaped German notice for some time.[44/]

Some Other Forms of Deception

Light and medium antiaircraft weapons, which were so dangerous to Luftwaffe pilots during their low-level attacks, habitually fired without using tracer ammunition, with the result that German planes sometimes began to smoke before the pilots realized that defensive action was being taken against them. It was a relatively simple matter for attacking German flyers to see Russians as they leaped off the railroad tracks when trains came to a halt, but it was more difficult to detect antiaircraft fire from the cars when no tracers were used.[45] Trains were occasionally sighted on open stretches of track, releasing steam

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* See photograph No. 33, p. 66a.

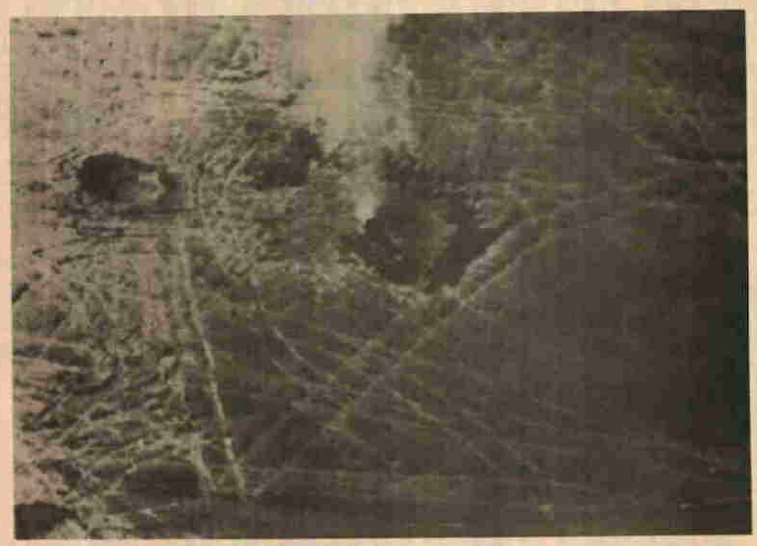
/ See photograph No. 34, p. 66b.

to attract attention. German aviators, tempted by such apparently easy targets, sometimes discovered too late that these rail cars were bristling with antiaircraft guns ready to trap unwary pilots.[46]

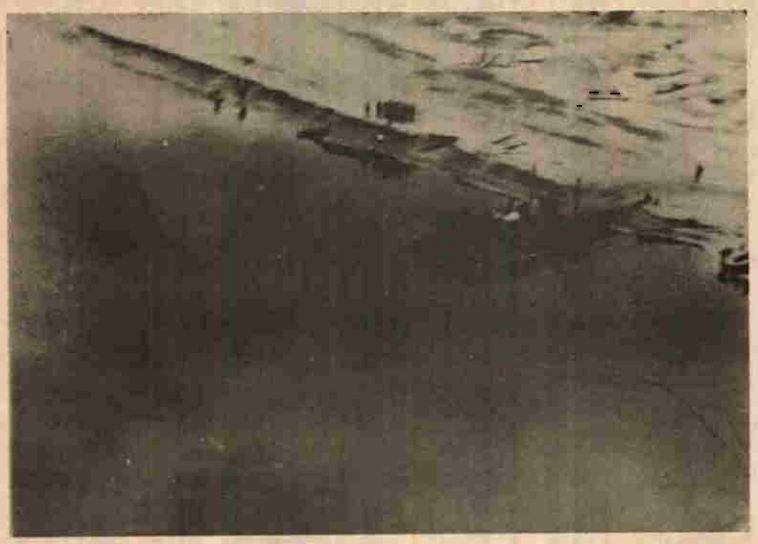
Russian logistical and troop movements by rail were likely to be underestimated by the Germans because of the incredible Soviet overexploitation of the carrying capacities of railroad equipment and their complete disregard for safety. As many as 1,000 men with full equipment were jammed into a single train. These soldiers were often loaded into the cars "double-decker." Russian trains, traveling swiftly at night on the same track, and at dangerously close intervals, were thus able to deliver a large number of men to critical positions in a surprisingly short time.[47]

Another interesting form of deception was seen in the countless river monitors which plied the meandering swamps of the Pripyat marsh area. They constantly sniped at German ground troops, making any thoroughfare extremely hazardous, and were difficult to destroy because of their ability to move under the cover of overhanging stream banks, where their bush-covered superstructures looked like so many small marshy islands. Armed vessels of this sort hampered German operations, while the Luftwaffe wasted its best efforts in seeking them out.[48]

Soviet deception was not always directed against the enemy. Aware of their solemn orders to wipe the enemy air forces from the skies, but mindful of the capabilities of German airmen, Russian pilots sometimes engaged in feint attacks to deceive their own air-direction teams on the ground.[49] Colonel von Riesen describes an incident of this sort, which occurred over the central theater of Russia in 1944. Thirty Russian fighters sighted a formation of 18 or 20 He-177 bombers flying 5,000 to 6,000 feet below them. Instead of attacking this formation, however, the fighters described pursuit curves far above them, firing into the air space above the bombers, far out of range. None of them closed in or dived upon the bombers, although they could easily have done so. "The sight of the Russian shell bursts, looking from below as if they were among the German aircraft, must have made quite an impression on the ground observer. . . . They had kept up appearances and probably had done much to confirm for the Russians the reputation of He-177 aircraft as being invulnerable to attack."[50]



Russian tank between the Don and Volga Rivers, releasing smoke bombs to simulate being hit.



Russian ponton ferry used in bridging operations.

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A Soviet railroad ferry across the Volga River at Astrakhan.

Chapter 6

SOME AIR DEFENSE MEASURES

Camouflage and deception were measures employed by Soviet forces with the intent of causing German airmen to draw erroneous conclusions from wartime events or observations and thereby to commit serious mistakes in their military operations. Despite the effectiveness of these deceptive measures, Russians often found themselves forced by circumstances to take more positive action, by both passive and active means, to safeguard vital areas, equipment, and personnel from Luftwaffe attacks. In the course of Soviet defensive operations, the Russian Air Force also took a toll of German flyers and aircraft.

Passive Defense Measures

Russian civil and military authorities acted initially to remove significant installations and equipment from the striking range of the German Air Force. When conditions prevented evacuation, equipment was then widely dispersed and, wherever feasible, shelters, revetments, and other forms of protection were provided to "reduce the susceptibility of facilities and personnel to damage or destruction through enemy air attacks."

One of the most successful responses to the incursions of German military forces was the evacuation of the Russian armament industry from the threatened western areas to the East. The great movement was carried out during the summer of 1941, using the most primitive means imaginable. Entire factories were moved to their new sites and put into operation within two months' time. The machinery arrived in excellent condition. A greatly accelerated work program soon enabled these industries to make up the time lost in the transit operation and to reach former production levels.[1]

Russians avoided concentrating their rolling stock in large rail centers, especially after the heavy German bombings of

Korosten, Fastov, and Darnitsa-Kiev.* Cars were thus shunted out to smaller depots, sidings, or tunnels whenever German air raids seemed likely. Russian locomotive engineers were clever in hiding their trains, moving at least the most important cars out of large depots, even when those places were being pinpointed for attack. German Air Force commanders soon became aware of this and, recognizing the difficulty of locating railroad equipment in remote depots or sidings, sent bombers along with the target-marking aircraft to prevent the evacuation of Soviet railroad equipment.[2] Once trains had left their stations for open stretches of track, however, it was usually necessary for them to continue on their way since several trains used the same track, one behind the other, sometimes even in sight of each other.[3] Trains were left standing only on out-of-the-way lines, beyond the range of German aircraft, since damaged rolling stock blocked main lines and depots.[4]

Commanders of Russian and Allied vessels evacuated their ships from endangered ports and put to sea at high speed at the first sign of German air attacks, although large and well-armored ships generally remained at anchor in port or out in the open harbor, berthed far apart to prevent a concentration of targets. For defense they relied mainly upon the heavy firepower of their own guns and the port weapons.[5]

Armored vehicles were obliged to use dispersed formations in order to avoid heavy losses from German air attacks. If attacked, tank drivers resorted to various devices to feign damage. If the enemy stopped the assault temporarily, all tanks able to roll under their own power drove for safety at high speed, moving in separate directions.[6] Houses, walls, or high smoke stacks made favorite hiding places for armored vehicles.* If there was no opportunity for cover, the tanks simply drove onward at top speed, hoping to make difficult targets.[7] The practice of attaching reserve fuel tanks to armored vehicles was soon abandoned because these

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* Editor's Note: These centers were all attacked during the battle for Kiev, 1 September-25 September 1941. See General-leutnant Herman Plocher (Ret.), "Der Feldzug im Osten 1941-1945" (The Campaign in the East 1941-1945), Vol. IV, Karlsruhe Document Collection.

* Editor's Note: Russian armored vehicles hid behind factory smoke stacks during the battle for Stalingrad, making difficult targets for German dive bombers.

containers could not be readily ejected in case of trouble, and often caused losses by fire or explosion. Instead, fuel was carried in trailers or drums drawn behind the tanks, which could be quickly separated from the vehicles if necessary. [8]

During the first part of the war, Russian supply columns traveled in close orders, but German tactical air operations and air interdiction soon forced them to move in extended, open lines. The advantages of this change were obvious to Russian leaders almost at once. [9*] The fear of air attacks among Russian drivers made many supply columns leave the roads upon the first signs of the Luftwaffe. The drivers then maneuvered wildly about in the nearby terrain, hoping somehow to escape damage. Sometimes panic was so great that motorized formations could be reassembled only by force. [10]

Initially, the Russians left their aircraft and airfield equipment unconcealed and standing in inspection formation. They soon learned to disperse these items widely, camouflaging everything possible with nets, leaves, and other materials, a practice which became standard procedure at all Soviet air bases. [11] When conditions permitted, however, Russian pilots took off upon the approach of the enemy to avoid damage to Soviet aircraft by German bombing or strafing attacks. [12]

When evacuation or dispersal was impossible or impractical, shelters, revetments, and fortified emplacements were prepared, especially at important points or installations. The necessity for such structures became apparent during the campaigns of 1941, when the German Air Force was able to inflict heavy damages upon Soviet personnel and positions. These protective structures were often made of reinforced concrete, but were also made of earth, wood, and snow when conditions permitted. Bivouac points, settlements, supply installations, headquarters, and command posts were provided with protection of this sort. [13]

Heavy bombings by the Luftwaffe often succeeded only in driving Soviet troops to cover. Secure within their fortifications, they stubbornly resisted the German attacks. Generaloberst Guderian points out that 1,100-pound bombs, dropped in 1941 by Luftwaffe dive bombers upon the fortress of Brest-Litovsk, were

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* See photographs Nos. 35 and 36, p. 70a.

unable to crack the thick masonry of the citadel. The garrison showed no sign of surrender until a horizontal bombing by the II Air Corps, using 2,200-pound bombs, demolished a corner of the fortress and its gun emplacements. [14*]

Operations carried out by the VIII Air Corps against the fortress of Sevastopol between 2 June and 2 July 1942 were unique at the time for bombing duration and intensity, yet Russian morale remained unshaken until the end. Many of the German dive-bomber pilots saw their bombs glance off the concrete cupolas or root up the earth around the bunkers. Aerial bombardment failed to destroy the main fortifications and to prevent Soviet infantry attacks in the close vicinity. [15] It seemed that the best bombing efforts could not break the enemy spirit. Lt. Col. Werner Baumbach/ describes this stout resistance:

> Earth, water, rock fragments, steel, and cement were intermingled with bleeding corpses. And yet the Russians continued to cling to their ground, their native soil, with unparalleled tenacity. [16]

Without antiaircraft defenses from the opening days of the battle, the Russians' fortifications were eventually reduced to a point that made surrender imperative. The fortress of Sevastopol thus became a symbol of determination for both sides. [17]

During this attack, the Russian headquarters was lodged in rock caverns in Inkerman Mountain near Sevastopol. The caverns also formed a convenient shelter for supplies and equipment. Tunnels had been cut into the banks of deep ravines to protect men and materiel. Only the heaviest high-capacity bombs were able to damage these positions. When the Soviet troops were finally forced to withdraw because of the advance of the Rumanian Army, they demolished the entire mountain behind them. [18]

Very heavy bombardments of the Sapun hill positions, running from North to South in the Crimean Peninsula, helped to create an exaggerated impression of German air capabilities in the minds of Russian troops. [19]

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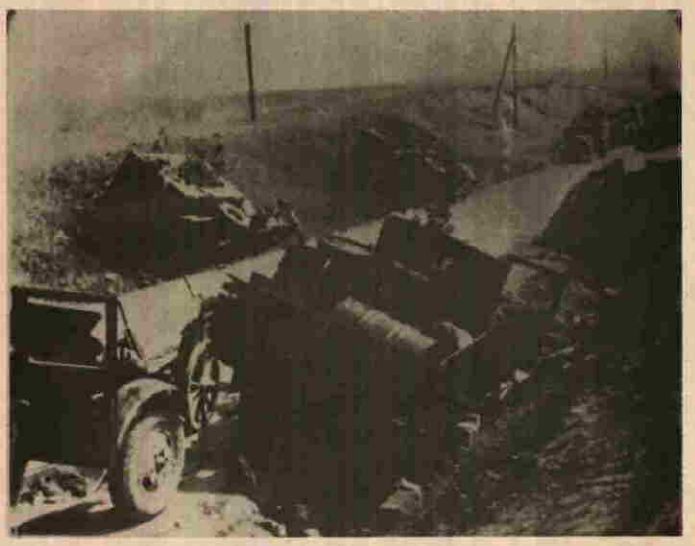
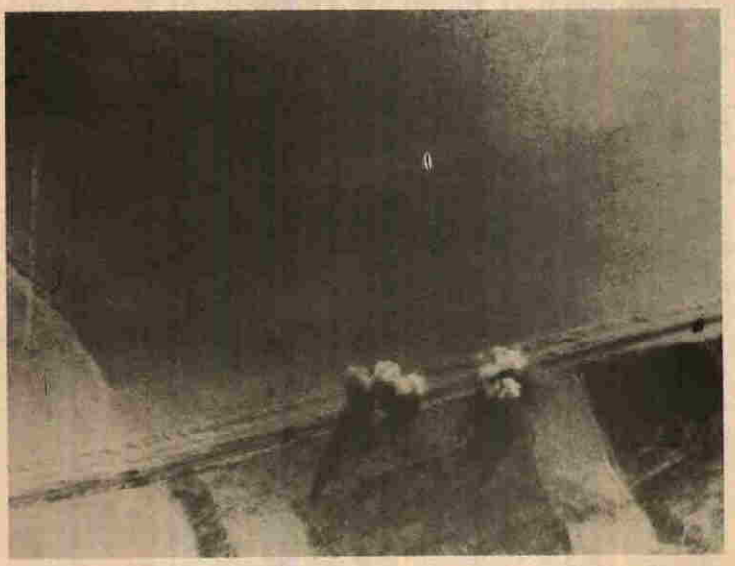
* See photographs Nos. 37 and 38, p. 70b.

/ Editor's Note: Baumbach, holding the Knight's Cross with Oak Leaf and Swords, was the most highly decorated German bomber pilot. He was killed in Argentina in an air accident in 1952.



Russian supply column destroyed by the GAF while traveling at close intervals 22 June 1941.



Russian supply column under attack by the GAF later in 1941, showing improvement in convoy intervals.

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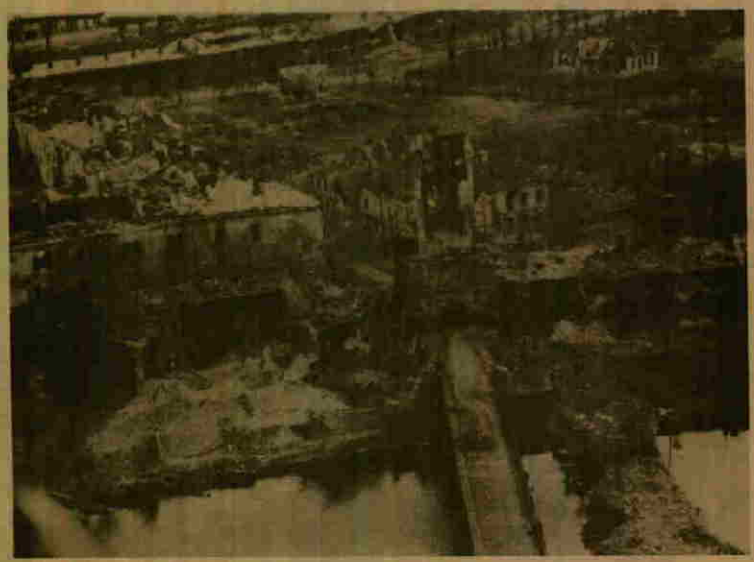

The citadel of Brest-Litovsk, showing heavy damage by the GAF, 1941

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The fortified Parpach Line in the Crimean area.

German fuel stores protected by
snow revetments in Russia.

While defending the city of Stalingrad in 1942, Russian troops showed great skill in exploiting the cover afforded by masonry ruins and basements, so that German bombing attacks were virtually ineffective. Aware of their security from air attacks, Red Army soldiers continued their defensive fire against the Wehrmacht, which was ultimately forced to dislodge them building by building and room by room.[20]

During the same year, Soviet infantrymen constructed a line of camouflaged, fortified trenches across the Kerch Peninsula known as the Parpach line.* These positions were further reinforced by concrete bunkers and emplacements at critical points. Here, as at Stalingrad, Russian soldiers sensed the security of their strong defenses and were difficult to dislodge, even with the heaviest bombardments.[21]

Revetments were constructed by Russian troops at all supply dumps and airfields to protect their personnel and equipment. During the wintertime, snow was packed into massive revetments to protect fuel, equipment, and personnel. All such structures were made by troops stationed at those places, and because of the duration of the winter, snow revetments were effective for many months. Even aircraft could be concealed behind these barriers of snow.† During the remaining portion of the year, earthen revetments protected men and supplies from bomb fragments. On the Kerch Peninsula, cleverly designed revetments of earth were equipped with camouflaged covers to hide aircraft. In a few instances, protective barriers were constructed from concrete.[22]

Active Defense Measures

While passive defense measures had the principal effect of reducing Russian losses so that Soviet forces could continue their military operations, active defense measures enabled them to detect, identify, stop, and destroy many of the attacking German aircraft. Not only did these measures inflict telling blows upon the thinly spread Luftwaffe, but they forced German airmen to exercise greater caution and to employ less auspicious tactics in making their assaults.[23]

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* See photograph No. 39, p. 71a.

† See photograph No. 40, p. 71a.

Although the Russians were acutely short of good communications equipment, they maintained a superbly organized espionage network behind the German lines which regularly reported takeoffs and landings of German aircraft, supplying unit designations and even identification marks to the higher commands. These agents permitted Soviet ground and air units to prepare for German attacks and to formulate counteractions.[24] Russian night and daytime operations were planned on the basis of information largely derived from intelligence agents. Although night and daytime units used the same intelligence material in formulating their plans for attack or defense, their operations were planned on a completely separate basis, almost as if they were to be accomplished by separate air forces in widely divergent theaters. Cooperation, which was such a vital part of Soviet Army actions, was not a characteristic of this phase of Soviet air staff work.[25] Russian intelligence officers were ever interested in discovering the locations of German night-fighter or night-bomber airfields, but seldom succeeded in finding them because of good German night security.[26]

German prisoners were thoroughly and carefully interrogated by the Soviet intelligence agents and forced to divulge details of various sorts, especially German signal procedures and aerial recognition methods. Experienced German Air Force men were often approached with offers to serve the Soviet Union, sometimes being promised freedom or even commissions in the Russian Air Force for the delivery of specific German aircraft types. One German pilot made the following report of his experiences in Soviet captivity:

> While flying a mission against Murmansk, Sergeant Gutsche of the 2nd Squadron, 5th Ground Attack Wing, was shot down and taken prisoner by the Russians. He was given excellent treatment and asked whether he was prepared to fly a Ju-87 from a German airfield and deliver it intact to a Russian airfield, which was precisely designated to him, and then, with the rank of a Russian lieutenant colonel, to train Russian airmen in dive bombing. The designated Russian airfield was hitherto unknown to the Germans and its presence was only discovered later through photo reconnaissance.
>
> Gutsche accepted the offer, firmly determined, however, to return to his unit and report his Russian-assigned mission. He was thereupon parachuted through the bomb bay of a Martin bomber at a point near the Arctic Sea road. After landing, he returned to his unit and reported the mission assigned him by the Russians. The Finnish Air Force at the time confirmed that similar cases had occurred.[27]

Very important German prisoners were flown by Soviet intelligence agents, often partisans, to higher headquarters for interrogation. General Ilgen (who presumably died in Russia, since he was never heard from again) was seized by partisans in the German rear area and flown that night to Moscow.[28] Partisan agents and fighters caused endless troubles for both the German Army and Air Force. Besides gathering immense quantities of intelligence information, they often attacked German airfields and forced Luftwaffe units to evacuate their men and equipment to more distant sites. Partisans were given the status of "national heroes" by Stalin. Thus German executions of partisans, even those captured with data which clearly identified them as espionage agents, were viewed as atrocities by the Soviet government.[29]

Intelligence data was also gathered by reconnaissance units of the Russian Air Force, usually in missions involving one or two planes. Tactical reconnaissance was invariably made by fighter aircraft, although fighter-bombers were widely used later in the war. Pe-2 units performed good work as reconnaissance organizations. Their operational altitudes were so high, however, that their vapor trails were easily visible from below. If German fighters were in the vicinity this usually meant the end of the Soviet aircraft.[30]

Occasionally Russian fighter or reconnaissance planes followed or "shadowed" German combat aircraft back to their bases. This tactic was seldom utilized, however, since special agents could secure so much more precise information and with infinitely less danger. Attacks upon German airfields were often made, nevertheless, on the basis of "shadowing aircraft" reports.[31]

Russian commanders sometimes ordered the erection of high towers near the front lines to serve as early warning outposts against incoming German aircraft. These structures were usually situated so that a view was obtained of considerable territory beyond the front lines. Occasionally German forward airfields were sighted, which were then attacked by Russian bombers.[32]

In the forefront of Soviet active defenses were the forward air-direction teams, a system adopted from the German Air Force in the summer of 1943. These teams proved to be extremely valuable in the most important sectors of the front. Forward

observers were quick to locate nearby German dive-bomber and fighter-bomber bases and were prompt in recognizing sectors of German main effort. They then transferred their fighter concentrations accordingly. Because of their activity, German Ju-87 dive-bomber sorties became impossible without adequate fighter protection.

The apparent merits of this arrangement caused the Russians to implement air-direction teams on a much broader basis than was the case within the Luftwaffe. A noncommissioned officer or commissioned officer of the Russian Air Force was attached to each ground regiment of the line, making it a simple matter to create a strong corps of ground observer and air-direction personnel. These air-direction teams responded quickly to the approach of German planes, especially German fighters, but their services were sometimes ineffective because of the weak tactical discipline within many Soviet flying organizations and the consequent ease with which German pilots dispersed their flying formations.

Some failures of the air-direction system among Russian units stemmed from a lack of radio discipline between Soviet flying units and air-direction teams, and the widespread practice of transmitting messages in the clear to air units.[33] An example of such a failure is illustrated by Rudel's report of a mission flown by his dive-bomber unit during the defense of Hungary in 1944:

> . . . Our effective strength in aircraft declined so far that one day I had to take off alone to hunt tanks. I was escorted by four Fw-190 fighters. I could scarcely believe my eyes when I saw Russian tanks far north of Kecskemét. *
>
> Above them was a cloud of fighters which were to protect the armored spearhead unit. One of the officers accompanying me knew Russian and immediately interpreted for me what he understood of the radio messages we intercepted. The Russians were again using almost the same frequency as us. They were shouting confusedly to one another. It was a surprise that they were able to understand each other at all. Their messages were more or less as follows:

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* Editor's Note: Kecskemét is located in Hungary, about 46 miles southeast of Budapest.

"To all red fighter units; one dive bomber with two long rods at the nose is approaching our tanks. He is escorted by a few Focke fighters. To all units: attack only the dive bomber, not the Focke fighters. He must be brought down today."

While they were still shouting confusedly I had already descended to fly one attack and one tank was afire. Two Fw-190 fighters were maneuvering higher up to divert a number of Lag-5 fighters. The other two remained with me, describing the same evasive curves I was flying. They did not want to leave me alone, which they would have had to do if they had accepted battle with a few of these Russian fighters. Twenty to thirty Lag-5 and Yak-9 now turned their attention to me. The officer directing their operations from the ground must have been close to the tanks because he kept on shouting: "Why don't you shoot down the Nazi swine at last? Don't you see there's one tank burning already?"

Strangely enough the tanks had not yet taken cover, probably in the belief that they were adequately protected.

The Red aircraft circled above the village, all of them shouting in confusion. Apparently all of them wanted to advise each other how to shoot down my Ju-87. The air-direction officer was furious. He threatened them and asked if they could not see that four tanks were already in flames. Now they again flew at me, actually coming from all sides, and I was glad that after the fifth tank my ammunition was exhausted.[34]

As Soviet air-direction teams gained more experience, they became much more effective in directing the fighter defenses of their positions and installations, operations which were clearly more successful after 1943.[35]

Russian fighter squadrons endeavored to be ready for instant action. Two planes and crews were therefore kept on the alert in each unit at all times. Pilots on standby were seated in their cockpits, ready for takeoffs in case of alarm.[36] Special interceptor fighter groups were often assigned by Russian commanders to the front sectors which were frequent scenes of

German bomber and dive-bomber activity. The operations of these interceptors soon forced German Air Force leaders to evacuate their forward area airfields, especially those which could be observed by Soviet air-direction teams or reconnaissance planes. Because Russian fighters along the front took an increasing toll of slower German aircraft, such as the Ju-87 Stuka, many Luftwaffe units were converted to Fw-190s, which were generally able to perform without fighter protection until the last months of the war.[37] Bombing and transport operations became more hazardous for the Luftwaffe as the war progressed and as the relative strength of the German Air Force declined. Germans therefore relied more and more upon fighter protection to avoid excessive losses from Russian fighter attacks.

Soviet fighters and interceptors hampered the effectiveness of German air operations in many ways. These fighters and interceptors were kept in readiness for use against the incursions of enemy "locomotive-hunting" planes, with the result that German airmen were compelled to vary their tactics in each operation. Sometimes German fighters were able to decoy Russian fighters away from the railroads, permitting "locomotive hunters" to work unmolested. Because of Russian fighters, Luftwaffe bomber pilots were hurried in their work and frequently failed to achieve optimum results. This interference also prevented German reconnaissance flyers from descending low enough to observe relatively obscure details behind the Russian front. However, since Russian interceptor bases were usually farther from the front lines than German tactical reconnaissance fields, German airmen were often able to perform tactical reconnaissance missions and return to their bases before Russian interceptors made their appearance.[38] The threat of Soviet fighters and antiaircraft guns was sufficient to keep most German reconnaissance flyers at high altitudes.

Russian fighters and interceptors were assigned as cover for strong Soviet armored columns, especially columns operating in areas of heavy German air activity. Nevertheless, German fighters were often able to divert these planes from their targets, so that German tank destroyers could accomplish their missions. In several places, such as at Sukhinichi southwest of Moscow, where Soviet armor had pierced the German lines between Moscow and Bryansk-Orel, Russian tanks failed to reach their objective because of German tank destroyers.[39] After 1942 the Russian fighter protection for armored vehicles was considerably strengthened.[40]

Fighters not assigned to provide cover for tanks were usually given interdiction assignments. These missions were carried out by roving bands of fighters operating from low altitudes up to 20,000 feet. Important cities and front areas of strategic importance were given around-the-clock fighter cover. Each squadron had its zone of operations and was usually limited to an area 12 miles on each side of the front and 12 miles to the right and left of the key point on the main line of resistance. Fighters were also provided for major routes of communication and entraining and detraining points. The crucial failure of German air units to sever the Lake Ladoga supply route to Leningrad in 1941-42 was largely a result of Russian air defense work. According to Maj. Hannes Trautloft, * the presence of numerous Soviet fighters made a German interdiction of Leningrad impossible. [41]

Fighter cover was invariably requested by the Russian front command during periods when their artillery batteries were zeroing in their guns and making other preparations to open up with regular firing. Used as a deterrent, Russian fighters kept German planes sufficiently far away to prevent positive location of the Soviet gun positions until the real bombardment got under way.

Besides interdicting the battlefields and providing an umbrella of protection for artillery and armored equipment, Soviet fighters were assigned the important task of escorting their ground-attack, bomber, and fighter-bomber aircraft. As the Russian Air Force gradually turned to the offensive, many more fighters were made available to escort the massed bomber and attack missions. By 1945, it was not unusual to see as many as 100 Russian fighters in the air at one time. In such circumstances they were then able to battle with the best German planes and to divert them from their objectives by massed attacks and by the use of clever tactical formations. [42]

Few Russian night-fighter actions were observed during the course of the war, and these were generally ineffective.

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* Editor's Note: Major Trautloft, now Generalmajor Trautloft, Inspector of Fighter Units in the West German Air Force, was the former commander of the 54th German Fighter Wing in Russia.

Inexperience and lack of proper instrument training made such missions hazardous for Soviet airmen. Near the end of the war night-fighter sorties were more common, but Russian flyers were never able to equal the skill and success of German pilots in this area. At least a dozen German pilots scored 50 "kills" or more during night operations in the East.* During most of the Soviet night operations Germans were amazed to see Russian planes flying with their positional lights burning.[43]

The defensive circle or Abwehrkreis was the standard formation used by Soviet fighters when under attack by German aircraft. This formation was also used on occasion when going into an attack or in areal defense operations. The excellent maneuverability of Russian fighters and fighter bombers permitted them to form tight circles, moving steadily in the direction of their own antiaircraft guns with each ellipse. At the same time there was an opportunity to bring the attacking German planes into the fire of the following Russian fighters. This means of defense was not infallible in many cases, as the following German report indicates:

> . . . as soon as they see Me-109 aircraft, they form their defensive circle, no matter how strong they might be in numbers. It was, however, possible to force individual fighters out of their circle. To do so, German fighters would slip into the center of the circle and open fire on the nearest plane. The attacked plane invariably curved away. The German plane thus gained a favorable firing position, and the attacked plane was shot down.
>
> . . . When attacked, Russian fighters usually return to Russian territory, where they fly in low curves over their antiaircraft artillery positions and then, still flying in a defensive circle, head for their home airfield.[44]

If Russian fighter or fighter-bomber pilots recognized approaching German fighters in sufficient time, they often preferred to work their way back to their own positions by flying the so-called

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* Editor's Note: While no effort has been made to verify these scores or to determine the basis upon which they were awarded, these credits have been recognized in a number of official and semiofficial German Air Force publications. See "Fliegendes Personal" (Flying Personnel), D/IV, Karlsruhe Document Collection.

snake formation (Schlange), which was quite effective in drawing German fighters over Soviet antiaircraft guns. Russian fighters had little opportunity to engage in counterfire upon an attacking enemy from this position, since the snake formation was almost purely evasive in character. It was, however, a much quicker method of reaching friendly territory than the traditional defensive circle.[45]

Russian aircraft began their takeoff runs at high speed to reduce the length of runway needed for takeoffs. If sighted by the enemy soon after takeoff, they remained at low altitudes, curving to the left or right in the general direction of their own lines and their own antiaircraft batteries. By flying for many miles at low altitudes, they were often able to avoid detection by the German Air Force. Such tactics complicated the tasks of German air reconnaissance, which by the autumn of 1944 had been made more hazardous by the growth and improvement of the Russian fighter arm.[46]

Russian leaders profited from the lessons of the "Blitz" attack upon London by regrouping their antiaircraft units so that light and heavy guns were placed within the proximity of searchlight units. These defenses were set up along all possible approach routes to the major cities. Around Moscow, an unbroken chain of antiaircraft units stretched in a circle 18 miles from the heart of the city, while decoy fires were lighted to mislead the enemy flyers.[47] Batteries of searchlights, such as those seen at Kuestrin, Stettin, Frankfurt-on-the-Oder, and other important points,* were set up in close coordination with heavy antiaircraft guns. Similar defenses were seen along the supply route over Lake Ladoga, where antiaircraft guns were erected upon ice bunkers. Searchlights were seldom used by Russian defense organizations, except at strategically important places, and were immediately shut off if attacked by German planes.

The perimeters of important points were dotted with large numbers of barrage balloons, which were sent aloft by their handling crews at the last possible moment prior to the arrival of enemy aircraft.[48] They were seen around Leningrad, Moscow,

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* See p. 45.

and certain industrial complexes. Mr. Henry C. Cassidy, who observed the Soviet defenses in Moscow during the war, gives the following graphic description of those measures:

> . . . Unseen, many other preparations were made. Moscow is situated in the heart of the Russian forest belt. Among the thick stands of coniferous and birch trees the largest number of searchlights ever assembled around one single center were set up in concentrically arranged circles. In the clearings, gun batteries were dug into the ground and covered with twigs and leaves, ready to rise in defense of the city. In the hollows, silvery balloons were waiting to carry the steel barrier of their cables into the air. Precautionary measures were taken in all details within Moscow itself against air and gas attack. Steel doors and air filters were installed in the subway stations. The concrete cellars of large dwelling houses and other buildings were reinforced with timber. Signposts appeared in the streets marked Bomboubezhishche zdess (air raid shelter here) and a black arrow. Every house committee appointed persons dwelling in the house as night and street guards. Boxes containing sand and asbestos gloves were distributed and placards were displayed with instructions on how to extinguish fires. . . . When the first bombs fell, . . . when light incendiary bombs were scattered along the roads and over the houses, then the population of Moscow climbed onto their roofs. It was thus that they saved the city.[49]

Leningrad and Kronstadt were well equipped with antiaircraft guns. In the latter city alone, 650 antiaircraft guns were mounted in various places upon docks, platforms, barges, and piers. These were further reinforced by the accurate guns of the Russian naval vessels in the harbors. The heavy batteries in Moscow, Leningrad, and Kronstadt were able to place their shots well to high altitudes.[50] Guns mounted around the Black Sea harbors, such as Anapa, Tuapse, and Sochi, delivered an "impressive" fire against German attackers, but lacked the accuracy of the northern ports' weapons, where even light antiaircraft gunfire reached German formations before the beginning of their bombing runs.[51] In the southern areas antiaircraft guns were sometimes placed in the mountains where fire could be effectively directed against German planes coming over the crests.[52]

Whenever necessary, the Russians hung nets from bridges or other structures to prevent the enemy from laying aerial mines. At

the Oder River crossing points in 1945, these devices were extensively used to defend against desperate German air attacks. In this last-ditch stand, German pilots attempted to destroy the Oder bridges by the use of spherical-shaped, high-capacity bombs. Most of these efforts were unsuccessful because of the quality and completeness of Russian defenses, which included nets, smoke screens, antiaircraft batteries, and aircraft cover. [53]

Railroad depots and installations, like transport columns and supply routes, had no initial antiaircraft defenses. After 1941, this situation changed dramatically and Soviet railroad centers were soon bristling with antiaircraft guns. [54] German air attacks upon these and other significant places soon induced Russian leaders to transfer antiaircraft guns to the points of greatest importance or those most imminently endangered by German air threats. Because of the effectiveness of Russian antiaircraft fire, four times as many German aircraft were destroyed in this way as by Soviet fighter engagements. [55] Sometimes antiaircraft units were shifted so quickly that German attempts to exploit breakthroughs were completely frustrated. [56]

When Russian troop movements or combat actions were disrupted by enemy air action, every available means was used to repel the attacks, regardless of the amount of ammunition expended. Fire was opened before German planes had come within range and was continued long after they had again passed out of range. When the situation at the front became static, even for a short time, ground defenses were increased to such an extent and fighters brought in in such masses that even German tactical reconnaissance around the front area could not be accomplished without fighter protection. [57]

By mid-1942 Soviet antiaircraft defenses were entirely adequate. Static positions, areas, moving columns, and even tank units were soon provided with flexible antiaircraft guns capable of following the evasive movements of German aircraft. [58] Defensive fire was also delivered in mass by Russian infantrymen and other personnel armed with various kinds of weapons, rifles, carbines, machine guns, mortars, or rocket launchers. Soviet soldiers were directed by their leaders to lie down on their backs or to assume other appropriate positions to facilitate a concentration of fire upon medium- and low-level attacking planes. This firepower was further bolstered by the inclusion of four-barreled antiaircraft machine guns. German leaders noted, however, that

this small-arms fire became steadily weaker if Luftwaffe units were successful in making direct assaults upon the Russian positions.[59]

Sometimes Soviet troops were ordered to conceal their positions from German reconnaissance. If German planes happened to bomb or strafe them, however, the Russians immediately assumed that their hiding places had been discovered and opened fire upon the attackers with all arms. These curtains of fire were so heavy that German flyers seldom remained below 7,500 feet for any length of time in the vicinity of Soviet lines.[60] Colonel Kupfer, Chief of German Tactical Support Units, points out that although Luftwaffe airmen were reluctant to remain at low altitudes over Russian positions, Soviet "Stormovik" pilots did not hesitate to do so over German positions. This he attributes to the fact that "on the Russian side everybody fires out of every buttonhole, while in our army everybody hides his head in the sand the moment aircraft appear."[61]

Chapter 7

EXAMPLES OF RUSSIAN IMPROVISATIONS

Improvisations in Repairing and Construction

Russian improvisations, especially those in the fields of ordnance engineering and mechanics, were surprisingly simple in character, well conceived, diversified, and highly effective. This was particularly noticeable in the rapid restoration of power for equipment needed for the Soviet war industry. In the city of Orel, for example, damaged generators were soon working at full capacity because the coils had been repaired by Russian workmen on turning lathes and a source of steam power had been devised from captured German locomotive boilers. Light and power were thus restored to Orel within four days after its recapture by Soviet forces. Damaged factories in many parts of Russia which were capable of continuing production, even if on a reduced level, were kept in operation by portable power units which were brought in by rail. The portable units were of decisive importance in the restoration of Russian industry after German air attacks. [1]

Bridges

River-crossing difficulties were solved by the Russians in a number of ways, including the use of ferries, conventional bridges, submerged bridges, ice bridges, and ponton bridges. When entire bridges or sections thereof were destroyed by the Luftwaffe, Russians often constructed large boxes of rough planks, which were filled with stones and used as bridge bents or piers. "Indian-style" foot bridges were erected for Soviet troop use, and remained unseen because they were set up after sundown and taken down before dawn. [2] Many Soviet bridging problems were solved by the use of ice. This unique Russian construction method is described in a general bulletin published in 1944 by the German Air Force High Command:

> 1. If the ice cover on a river is not yet thick enough to carry vehicular traffic, the Russians place a layer of twigs on the surface and continue pouring water onto this layer until a considerable thickness of twigs and ice is formed. Even the heaviest loads

can be moved over the ice embankments thus formed. Ice bridges of this type even remain firm during the thaw, melting far later than the normal ice cover on the river.

2. In winter the Russians lay railroad tracks on the firm ice surface of large lakes (for example, Lake Ladoga). On these railroads they transport troops, supplies, and materiel. When the ice thaws in the spring the rails are simply left in place and sink into the water.

3. Air photographs repeatedly revealed railroad tracks which had been laid on the ice but did not sink when the ice thawed. It was discovered that the Russians had used the ice cover during winter as a construction platform and had constructed a durable railroad bridge supported by timber piers and cross trusses. The bridges escaped detection for so long because they were just above the surface of the river and thus caused no shadow.[3]

Bridge repairs were completed so quickly that German bombing attacks were of relatively brief effect. Crossing points at strategic locations were given high priorities in the allocation of men and materials for repair work. Maj. Georg Jakob, leader of the German 10th Ground-Attack Wing, gives the following report of the repair of the strategically important railroad bridge at Bobruysk in the northern area, a structure which had previously been destroyed by German air attacks:

. . . After this bridge had been destroyed, the Commissar for Communications immediately left Moscow and hurried to the scene. Here, he personally directed the work of provisionally repairing the damage. For the purpose he brought in several hundred skilled workmen from all parts of Western Russia. The bridge was repaired in a relatively short time.[4]

German bombings of Don River bridges succeeded in delaying the movements of men and materiel into the bridgehead areas, but many of these places were soon crossed by ponton bridges which were concealed in the nearby bushes along the banks. These could be quickly floated into position and bridged over.[5] If none of the regular modes of bridging seemed possible or if exigencies required,

all sorts of improvisations were made to effect a crossing. This was evident at all major rivers. For example, when German Air Force dive bombers sought to prevent Russian passage across the Tisza River in Hungary during the defensive battles of 1944 they:

> . . . attacked the constantly appearing new bridges and cross-river traffic accomplished by the Russians, at times with the most primitive of means. Beams, rafts, old barques, fishing boats, sport boats--everything conceivable was used by the Russians to cross the narrow Tisza River, and we never knew where we should attack. [6]

By the time the Oder River was reached by the Russians, their crossing techniques were much improved, largely because of their prior experiences. Soviet forces were able to carry out river crossing operations on a very broad scale once the initiative passed to them. [7]

Roads and Railroads

Repair measures used by Soviet forces for communication routes damaged by German air attacks were partially prepared in advance and partially improvised on the scene. Materials for the project were stockpiled and work teams were posted near important traffic installations or along important rail or roadways to insure a rapid restoration of those lines. The civil populace, regardless of age or sex, was also pressed into labor service to accomplish the mission. Because of the adequate supply of labor and materials, the degree of success achieved by such measures depended chiefly upon the initiative and resourcefulness of the local commander. Heavily damaged rail or road sections requiring lengthy repairs were detoured, but, in general, repairs were accomplished so quickly that German bombings seemed to be only brief deterrents. In some cases traffic flowed across these routes within 24 hours after they were supposedly "destroyed" by the Luftwaffe. [8]

Although repair methods used in restoring Russian rail lines were initially poor, techniques were rapidly improved. Places likely to be hit by the German Air Force were therefore well stocked with rails, ties, planking, and even bridging supplies so that single-track lines could be repaired and put into

operation within three hours and double-track lines within eight hours. Time was of the essence to Russian field commanders. Therefore, single lines of track were normally repaired ahead of additional arteries of the main line, and prior to general rubble clearance.[9] Large, time-consuming projects, such as earth moving, were avoided and detour lines were immediately readied for use pending the repair of the main track. Locomotive engines or cars blocking the route were simply dumped in nearby ditches, especially if the locomotive cylinders were damaged.[10]

Repairs were hastened by the immediate salvaging of all bolts, nuts, fishplates, throw switches, and other special items, which were then cleaned and prepared for reuse. Safety considerations were regularly sacrificed in favor of speed and convenience. All sorts of odd parts and equipment, including salvaged parts from German and Russian locomotives, oil drums, trees, and parts from damaged equipment, were used to complete makeshift repair jobs.[11]

Aircraft

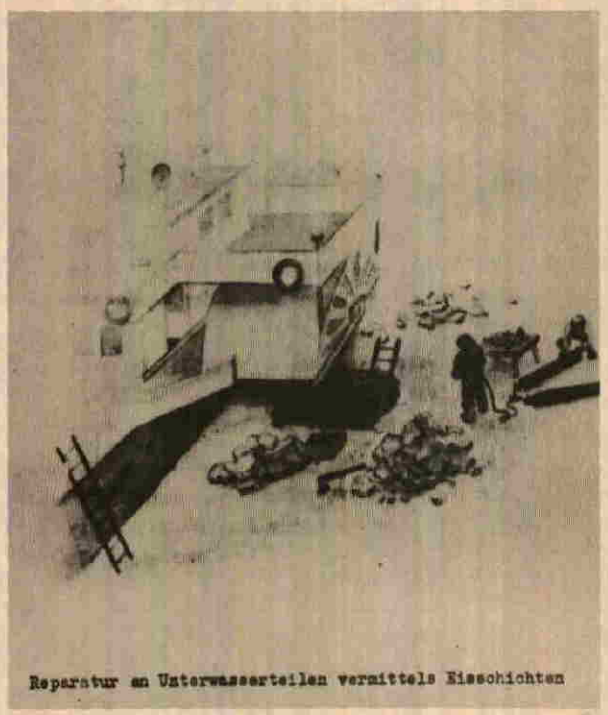
The ground services of the Russian Air Force carried out extremely rapid repairs upon damaged aircraft, sometimes cannibalizing other planes for spare parts. Russian planes were designed so that they could be maintained and repaired with crude, almost primitive means:

> . . . The frequency of shell damage made it an imperative necessity to resort to makeshift solutions which would save time and labor in the repair of damaged aircraft. This is particularly evident in the case of IL-2 aircraft. In repairing damage to the plywood fuselages of these planes, the Russians simply rivet tin strips, or glue plywood strips, or, if the damage is very small, glue cloth to both sides of the damaged part.[12]

Soviet ground services also kept busy constructing and repairing airfields and shelters, defending these places against hostile air action, and distributing supplies. Hangars, hardstands, and even runways were often improvised from wood or other materials at hand. Concrete runways were seldom seen.[13]

Reparatur der Schiffsschraube.
Das Vorschiff ist mit Wasser gefüllt.

Repairing aft parts of a vessel by flooding forward holds and emptying those astern.



Reparatur an Unterwasserteilen vermittels Eisschichten

Repairing hull of Russian vessel from ice chamber below water line.

Vehicles

Damaged tanks and other vehicles were quickly retrieved from the battlefield by the Russians and restored to working condition. After sundown Soviet troops immediately set about their work, even in inclement weather. Parts for repairs were salvaged whenever possible from badly damaged German or Soviet vehicles. Sometimes parts were improvised on the spot by Russian workmen from scrap materials. German pilots soon learned that enemy vehicles had to be clearly destroyed in order to eliminate them from future Soviet operations.

Ships

Russian improvisations in the repair of ships deserve mention. Although their methods were admittedly a result of acute shortages of materials and repair facilities, the Russians were effective in the restoration of their equipment to serviceable condition and in preventing German confirmation of damages, especially when vessels were temporarily inactivated.

A favorite method of repairing rearward parts of a ship's hull, its propeller and rudder, was to pump the forward holds full of water, emptying the stern holds at the same time, until the vessel was nearly awash at the prow. The screws were thereby raised out of the water. During the operation the ship was kept from capsizing by being made fast to a strong wharf. From above German observers could not detect that any repair operations were under way.*

In extremely cold weather, repairs were made on the sides of ship hulls or paddle wheels by berthing the vessels some distance from a pier, allowing the ice to freeze solidly around them. When the ice had hardened to a sufficient thickness, it was cut down immediately adjacent to the ships at the precise points of damage, thereby forming sublevel rooms, next to the hulls, completely encased in ice on three sides. Workmen then stood on the solid ice floor and carried out the repair operations.[14/]

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* See photograph No. 41, p. 87a.

/ See photograph No. 42, p. 87a.

Labor Improvisations

Being frequently isolated and cut off from sources of heavy equipment because of successful German air attacks, Russian officers equipped gasoline drums with simple handles for the rolling of airfields and hardstands. These drums were also pulled behind tanks as fuel reserves. Drums of fuel were rolled to critical areas of the front, moving from village to village, by hand labor of older men and women, and children, recruited, often by force, for the purpose. German air attacks were thus unable to prevent fuel and provisions from trickling into the front areas. [15]

Generalleutnant Andreas Nielsen observed special, camouflaged repair depots during his tour of duty in Finland and the Far North of the Soviet Union. Near these well established centers were large labor camps which furnished the necessary manpower for the more routine and heavier aspects of construction and repair work. These camps were usually filled with various sorts of prisoners, both civil and military. They were exploited in a completely ruthless manner, without regard for health or safety, since their lives were often spared only for the purpose of providing an incredibly cheap and expendable source of labor. [16]

German Air Force units withdrawing from fields which they had occupied in the Soviet Union often attempted to deny the use of those bases to the enemy by planting SD-2 pressure and acoustical bombs in various places around the field, many underground. The slightest pressure was sufficient to detonate the charges. This practice was soon discontinued when it was learned that the Russians were countering by driving German prisoners of war at gunpoint across the airfields. Minefields were cleared in the same fashion. Large numbers of German soldiers thus lost their lives in the service of the Soviet Union. [17]

Russian leaders also were rigorous and demanding of their own people who were voluntarily or forcibly recruited for labor, a situation which seemed to have been taken for granted by most citizens of the Soviet Union. The city of Stalingrad is an excellent example of this spirit. Here, factories continued to produce guns and tractors while the battle raged all around them. The fact that workers were occasionally killed by German artillery bursts did not cause any noticeable slackening in the defense plant activities. Foremen continued to demand the utmost exertion from all of their workmen. At Gorki, Russian workers continued to maintain their production levels of tanks and armored equipment while the plant was under heavy German air attack. [18]

Improvisations with Arms and Explosives

Russian forces habitually used German Army and Air Force explosives which they salvaged during ground operations, or which they were able to neutralize by the use of prisoner-of-war demolition groups. German bombs were thus sent immediately to Soviet air base installations where they were converted for Russian use. During the Russian counteroffensives around Stalingrad and the Caucasus area, a large number of German aircraft bombs fell into Soviet possession. Russian Air Force armament personnel then removed the original fuses from these missiles and replaced them with those of Russian manufacture.

Hollow wooden bombs of very light construction were built by Soviet air base personnel. Known as "propaganda bombs," these were filled with a variety of psychological warfare leaflets and dropped in large numbers over German lines and installations. These had some effect upon German morale when conditions were very unfavorable for Germany. Although large numbers of German soldiers were never moved by these efforts, more Germans responded to Russian propaganda overtures than Russians responded to those of the Germans.[19]

Rocket and Machine Gun Mounts

Russian troops, faced with frequent German air attacks, soon abandoned their mediocre gun mounts in favor of ring mounts upon light trucks. These trucks, bearing machine guns, could then be quickly moved to any favorable site, camouflaged, and made ready for antiaircraft firing. This practice was especially applicable to airfields, where these weapons could be rapidly moved to the areas under attack by German air units.[20]

Special quadruple machine gun mounts were later used on these trucks, as well as at river crossing sites, railroad depots, and entraining and detraining areas. The forward and rearward cars of Russian troop trains were also equipped with such weapons after 1942, especially near strategically important areas.[21]

In 1942, another improvisation was implemented at Russian airfields. Aircraft rocket launchers were placed upon ring mounts on stands and used as antiaircraft weapons. These were soon so effective that they were widely used at most Soviet air bases by early 1944. It was essentially an adaptation of the aircraft rocket, fired from rails mounted on circular tracks.[22]

Chapter 8

SOME SOVIET DEFICIENCIES

Throughout the war German leaders were aware of Russian fears of the Luftwaffe and the frequent inability of Russian antiaircraft forces to act in accordance with the current air situation when attacked.[1] German airmen generally had little fear of Russian heavy antiaircraft guns, except around the well-defended port cities of Kronstadt, Leningrad, and Sevastopol. Soviet batteries usually sent up a round or two within or just ahead of the advancing German aircraft formations, which immediately caused the planes to change altitude and to fly in curving patterns. At this point Russian heavy gun crews seemed to be unable to track them or made such incorrect range estimations that their salvos fell far wide of the mark or burst at improper altitudes.[2] Ju-88 units attacking marshaling yards in the Leningrad area in the spring of 1943 experienced heavy antiaircraft fire from the large calibre batteries around the city. All of the bursts were high since Russian gunners obstinately persisted in following the altitude estimates which had been made for He-111 bombers.[3]

Erratic, and therefore ineffective, firing was typical of most Russian heavy antiaircraft batteries. They never adopted the close range firing techniques which had been used so successfully by German Flak units. This was possibly a result of the Soviet reliance upon light and medium antiaircraft weapons, with which they had achieved good results in close range firing.[4]

Russian aviation achievements were generally so mediocre that German pilots could return to the Eastern Front after absences of a year or more and make use of the tactics which they had used previously, with a feeling that they had never been away at all.[5] Russian pilots lagged far behind German pilots and the Western Allies in the fields of general aeronautics, navigation, and bad weather flying. As a result, they could make only limited use of the complex aircraft which they captured intact and of the equally advanced equipment supplied to them by their Allies. Soviet pilots were never able to obtain maximum performances from these planes, and such devices as the Norden bombsight were never mastered by Russian aircrews.[6] Because of these deficiencies Russian flyers seldom carried out missions deep within German territory. When the Soviet Union began its attacks upon the tanks of the Second Panzergruppe* German armies in the

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* Editor's Note: This unit was commanded by Generaloberst Heinz Guderian.

rear areas were unmolested.[7]

The flying deficiencies of Russian pilots also enabled German dive-bomber and fighter-bomber pilots to shake off their pursuers by such simple expedients as defensive circling. Even many of the slower German aircraft were relatively safe for much of the war, as can be seen from the following report made near Kola Bay in 1941:

> . . . A Ju-87 pilot who had lost contact with his formation while returning from a dive-bombing mission on the port of Murmansk, and whose machine guns had jammed, succeeded by evasive maneuvers alone in shaking off a pair of Russian fighters which flew in twice to attack him.[8]

Similar reports were made by Luftwaffe pilots during 1942 and 1943.

Soviet fighters remained basically vulnerable to German air attacks and were often confused and nearly helpless if surprised by German fighters. Soviet air units were organized to handle any eventuality, but in practice their reactions were far too slow or incorrect when unexpected situations developed.[9] Even in 1943 and 1944, when German bomber pilots had come to expect Russian fighter interception, Soviet pilots seemed to be tactically weak and beset with organizational and command problems in the air.[10]

Russian fighters normally limited their attacks to German planes which were on single missions, had straggled, or were otherwise in difficult straits (although they sometimes demonstrated greater enterprise). When German fighters approached, Russian fighter pilots opened fire before the enemy was within range. This reaction was made not only because of fear, but in a desperate hope that they might thereby increase their effective firing time against the Germans.[11]

All shortcomings were not consequences of Soviet fears, however. Audacious, almost foolhardy, attacks were sometimes carried out by Russian pilots, many of which turned out to be utterly fruitless. An instance is recorded in which two Soviet "Rata" I-16, low-wing fighters attacked a German airfield at an altitude of about 70 feet. Although the visibility was poor and

German antiaircraft fire was intense, they exhibited incredible folly by returning for repeated passes, until both were shot down.[12] Near Kronstadt, Russian fighters doggedly followed German dive bombers down as they attacked Soviet naval vessels. As a result, the Russian planes were shot down by their own antiaircraft guns.[13]

Because Soviet flyers were generally afraid of enemy fire, they normally hesitated to make return passes over targets, even when they had no reason to expect antiaircraft fire. Sometimes, when specific combat missions were assigned to Russian units, Russian pilots might be extremely tenacious in trying to accomplish their goals. Sometimes this tenacity bordered upon stupidity. During a mission near Kiev, early in the war, Captain Pabst saw 10 Soviet bombers flying steadfastly toward their target. German fighter pilots were leisurely picking them off, while the formation of bombers seemed to make no effort to evade the attacks. Faithfully holding their formation and following their leader, the Russian bombers continued onward until all of them were destroyed. It was a serious weakness of Soviet units that only the leader was entrusted with general knowledge of the mission. Since the flight leader was normally the only person possessing a map or with knowledge of the objective, German pilots soon learned to concentrate their attacks upon the lead aircraft. If the Russian air commander was shot down, the remaining pilots thought only in terms of fleeing back to Soviet territory.[14] Tightening up their formations did not help the Russian pilots avoid losses to German fighters, and occasionally individual Soviet bombers slipped out of formation and attempted to get back to their bases.[15]

Lack of Aggressiveness

Russian unwillingness to engage in aerial combat with German flyers, especially German fighter pilots, could be partially attributed to low morale arising from the fact that nearly 90 percent of all Russian fighters destroyed by the German Air Force were shot down over Soviet territory.[16] Russian pilots were also reluctant to venture beyond their front lines and turned for home at the first signs of danger.[17]

The hesitation of Russian flyers to accept challenges at higher altitudes might be a result of knowledge of their own aircraft's limitations. Most Soviet fighters were not equipped for reliable high-altitude combat operations, and training for such engagements was

seriously lacking. Even advanced models (such as the Yak-3*) were at their best at lower altitudes, where they were superior to the Me-109 and the Fw-190. The Yak-9, developed about the same time as the Yak-3, possessed superlative handling qualities and was highly maneuverable at low and medium altitudes, but above 10,500 feet the Fw-190 was easily its master. Soviet fighter pilots thus preferred 5,000- to 8,000-foot altitudes. Even here they generally declined battle unless the Germans had a hopeless numerical inferiority.[18] Soviet fighter victories were few and were often due more to good fortune than to aeronautical skill. The Russians constantly sought the latest types of planes from their allies in hope of matching the performance of the Fw-190, which they especially feared.[19]

Soviet fighter pilots often failed to attack German bomber formations, from which they could expect strong fields of fire. In the latter part of the war, when Russian fighters finally began to attack enemy bombers, their tactics were poor and their operations unsystematic in character.[20] The firepower of the He-177 and the speed of the Ju-88 were sufficient to keep Russian fighters away during most of the war, unless the Soviet units had clear advantages in numbers and firepower.[21]

The respect for German aircraft remained until the closing months of the war, although the aggressive spirit of Russian fighter pilots improved after mid-1942.[22] Combat aggressiveness of Soviet flyers was usually most apparent over their own territory and in situations where their aircraft greatly outnumbered the declining Luftwaffe. Achievement of this numerical superiority came too late to be of real significance to the overall course of the war, and until the end, German pilots claimed that Russian pilots were affected with "the jitters." In the Crimean area German fighters stood off Russian fighter units 25 times their own strength.[23]

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* Editor's Note: The Yak-3 came out in 1943 as a low-wing, single-engine, liquid-cooled fighter designed for air support work. The Yak-9 was a similar type of aircraft, and both were highly popular with Russian pilots. See photograph No. 7, p. 9a.

Fearing German attacks, Russian pilots flew along just under the canopy of cloud cover, ready to dart into it at the first sign of danger. They also arranged their flights so that they could take advantage of the prevailing east-west winds in case of trouble.[24] When the ceiling was high, Russian planes usually attempted to escape by flying at extremely low altitudes.[25]

Russian flyers feared not only fighters and certain bomber units, but tank-destroyer planes as well. Luftwaffe flyers were thus able to wipe out entire armored units with relatively little Soviet interference. Russian tanks which had pierced the German lines defending the Bryansk-Orel road* in 1943, were successfully intercepted by Luftwaffe antitank aircraft and completely destroyed before they could reach their objective.[26] On another occasion, on 2 January 1943, a German battle group was surrounded in the village of Antonovka, about 140 miles north of Rostov-on-the-Don, by a number of Soviet armored units supported by infantry troops. Although many Russian fighters were in the vicinity, the German Air Force tank-destroyer planes flew in to attack the tanks with cannon fire. After a number of tanks were destroyed, the remaining vehicles and the attacking infantrymen broke into a disorderly retreat. In this case the hesitance of Soviet airmen permitted German Air Force pilots to snatch an almost certain victory from Russian hands, for at the time Wehrmacht ground troops were making their last defensive stand.[27]

Russian tank crews sometimes permitted panic to override their judgment. Despite their antiaircraft defense potentialities, they occasionally jumped out of their tanks at the first sign of an air raid and ran for cover, leaving their vehicles to be destroyed.[28] Infantrymen who rode on the tanks usually led the retreat. Russian infantrymen in other situations generally fled if brought under a direct dive-bombing attack. Those who were in fortified positions usually preferred to die there rather than risk moving to other areas. If the local commander was killed in assaults upon fortifications, impending offensives were usually called off.[29]

A weakness of Soviet antiaircraft batteries was noted when section leaders or battery commanders were absent from their immediate gun positions. With these leaders gone, Russian gun crews generally evacuated their places in a hurry at the first sign of attacking German planes. Apparently officers were needed to prevent panic and to give directions to the gun crews.[30]

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* Editor's Note: This was near Sukhinichi, about 140 miles southwest of Moscow.

Conduct of Soviet Air Operations

Russian air operations were monotonous and stereotyped in character, indicating a limited imagination in tactical matters and rather low standards in technical control facilities.[31] Inflexible leadership made on-the-spot changes in air operations difficult, and the principle of "blind obedience" hampered things even more. Russian aeronautical weaknesses were not merely consequences of the devastating early blows by the Luftwaffe, but were also products of a weak affinity for aviation and an inadequate training program. Frequent absences of enlightened air staffs compounded the problems. An exaggerated emphasis upon close support also limited the scope of Russian air operations.[32]

Soviet air missions were chiefly results of developing circumstances and expediencies rather than of deliberate planning by Russian leaders, many of whom knew little about the use of airpower but nearly all of whom were careful to observe the fine points of subordination to their superiors. Russian Air Force objectives were centered upon infantry and artillery positions and, late in the war, armored units.[33] Because of this, German leaders, like Generalleutnant Adolph Galland,* never considered the Soviet Air Force to be anything more than an appendage of the Red Army, the artillery arm of the air.[34]

Fighter operations were almost wholly defensive in character no matter what type of German air unit they might oppose; perhaps this was a manifestation of an acknowledged technical and tactical inferiority and of the principal mission of providing support for the army. Russian fighters attempted to establish local air superiorities by escorting ground-attack and bomber units, although they were seldom successful. Doctrinal and tactical limitations of the Soviet fighter arm throughout the war indicated that it was incapable of embarking upon offensive operations.[35] Fighters engaged in battle with German fighters only if they could not otherwise avoid it, preferring to pounce upon crippled, nonfighter aircraft.

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* Editor's Note: Galland, the best-known German fighter ace to Americans, is credited with 103 aerial victories. He was Inspector of the German Air Force Fighter Forces and worked after the war for the USAF on the von Rohden Project. He later served as an advisor to the Argentine Air Force and is now reported to be a representative for an American aircraft firm in Germany.

"Swarms" of Russian fighters, usually about five in a swarm, were frequently seen after 1941, flying in reasonably good order and with proper intervals, a possible indication that they had recognized the effectiveness of such formations in German air units. In general, however, their rather poor formation patterns enabled German pilots to identify them at long distances. [36]

While Russian pilots appeared timid as individuals, they could sometimes be daring in a group. In such cases some fighter pilots became so intent upon their targets and so stubborn in their efforts to bring down the enemy that they rammed German aircraft. Some Russians even developed a technique which enabled them to damage enemy planes with comparatively little damage to their own aircraft. [37*]

Large air strikes by 40 bombers or more were rarely made by Soviet flying units, and even then the actual attacks were carried out singly. Retaliatory bombing, such as was seen in the West, was seldom attempted, and when it was, its effects could hardly be compared with heavy German bombardments, and even less so with the massive, saturation bombing carried out by the Western Allies. The idea of saturation bombing appeared to be unknown to the Soviet Air Force. [38] Russian bomber pilots used only a few simple formations because of their limited aviation skill. Once their formations were broken or the lead planes knocked down, the remainder of the units could be quickly scattered and eliminated. [39]

In order to escape German fighters, Russian bombers began to attack German Air Force bases from altitudes above 16,000 feet. A single bomber, or perhaps two, would appear after daylight in the morning or well before sunset in the evening, dropping a few fragmentation bombs. Sometimes small groups of bombers would participate in such flights. Few of the bombs fell near the targets and, in several instances, they dropped within the Soviet lines. Night bombing attacks by the Soviet Air Force were equally ineffective. Carelessness in the bombing runs and poor marksmanship characterized both bomber and fighter-bomber operations of the Russian Air Force. Most Soviet flyers tried to release their bombs as soon as possible over the German air bases in order to flee as the German antiaircraft guns opened fire. Such piecemeal, unsystematic efforts made little impression upon German Air Force personnel. [40]

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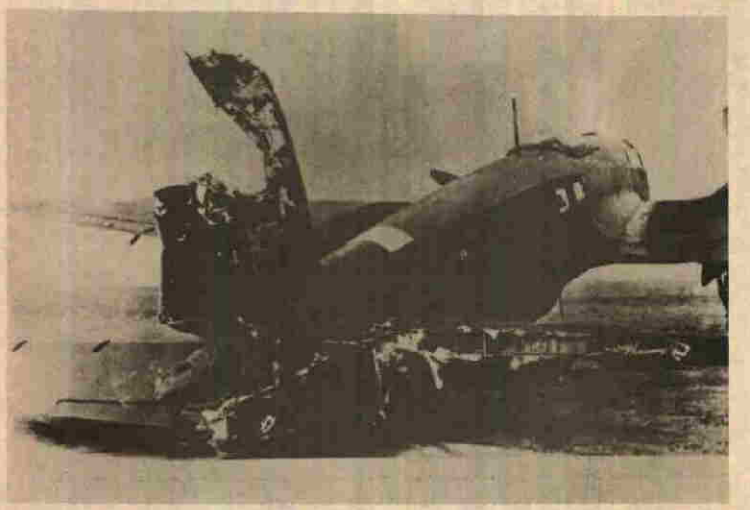
* See photographs Nos. 43 and 44, p. 96a.

A German Fw-189 close reconnaissance plane rammed by a Soviet "Rata" I-16.



A German He-111 bomber rammed by a Russian fighter over Gorki.

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Russian I-153 (version of the I-15) fighter, called the Gull (Chaika) during the Spanish Civil War.

The Russian I-16 fighter, dubbed by the Spanish Nationalists and the Luftwaffe as the Rat (Rata).

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German leaders were continually amazed that Russian ground and air units never singled out Luftwaffe searchlight and directional centers for attacks. They interpreted this as an indication of a failure of Russian commanders to appreciate the significance of such stations to the overall campaign.[41] Soviet leaders also lagged in producing antitank aircraft, presumably because they were slow in learning the procedures for attacking armored equipment. This failure permitted German tanks to operate in relative safety from air attacks throughout most of the war.[42]

Among the many missed opportunities of the Soviet forces, none was more striking than the failure of the Russian Air Force to follow up the retreating German forces in the withdrawal from Moscow during the winter of 1941-42. Any sort of systematic assault upon those retreating columns, which were then choking the few available traffic arteries, would have dealt a heavy blow to the Wehrmacht.[43*]

The great initial successes of Germany in Russia were partially due to the failure of the Soviet long-range reconnaissance arm. Following the early damage of 1941 upon the Russian air forces, their tactical reconnaissance units were the only organizations capable of fulfilling combat missions. But even this service was deficient in many respects. Training of reconnaissance pilots was basically faulty and technological and operational weaknesses plagued reconnaissance units until the closing part of the war. Long-range reconnaissance flights usually were not carried out in sufficient depth to provide good intelligence data, while photo-interpretation work was so poor in the Soviet Air Force that missions were seldom made solely on the basis of this information. For example, in April of 1944, a Russian Pe-2 reconnaissance plane appeared over Daugavpils, Latvia, and was humorously dubbed "the reconnaissance duty officer" by German airmen because of the regularity of its arrival between 0700 and 0800 hours. This plane obviously made a practice of scouting German airfields and installations near the Dvina River, but, despite the frequency of these visits, no air attacks or bombardments followed.[44]

Another area of Russian deficiency could be found in the unfavorable flying techniques employed by Soviet liaison pilots.

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* Editor's Note: By November 17, 1941, many German regiments had already lost as many as 400 men to the freezing winter weather. See Guderian, Recollections, p. 225.

Russians often used their liaison aircraft to transport important partisan and military personnel, which made these planes prime targets for the German Air Force. Painted to match the landscape, the planes were difficult to observe from above, but without fighter cover they were extremely vulnerable to German attacks. So many of them were soon shot down that Russian generals switched to fast bombers or fighters with fighter escorts for their personal transportation. Luftwaffe leaders noted that Soviet liaison pilots invariably used railroad tracks as their guides, flying along with their left landing gear above the right-hand line of track. Although this mode of operation became widely known among German air units, with the consequence that hundreds of Russian liaison planes were shot down, especially by Fw-190 fighter-bombers, Russian liaison pilots continued to stick to the railroad tracks, without fighter cover.

Material Deficiencies

At the outbreak of the war the Soviet planes were largely obsolete, and the older models were rapidly destroyed by the German Air Force. The situation was so bad that a single German fighter, if well handled, could ward off large numbers of older Russian fighter planes. The line fighters in the U.S.S.R. in 1941 were the I-15 and the slightly improved I-153 biplanes, stemming from a 1932 design.* With top speeds under 200 miles per hour they were no match for the Me-109s of the Luftwaffe. Another radial-engine plane, the "Rata" I-16 low-wing monoplane (derived from a Boeing design), which had been employed in large numbers during the Spanish Civil War, was widely used and became the mainstay of the Soviet fighter arm in 1941.† They were highly maneuverable planes, but their speed left much to be desired, and since only the best Russian pilots could fly well enough to take advantage of their fine turning qualities, the Germans made short shrift of them. Most serious of all was the fact that these models caught fire easily if struck from above or from the side. Efforts to fireproof them by applying coats of artificial, fireproof resin to the surfaces were unsuccessful.[45]

American P-40s were as maneuverable as German fighters, but since they were inferior in speed and climbing performances Soviet pilots did not favor them.[46] The Bell P-39 "Airacobra" and the P-63 "Kingcobra" were capable fighters and were highly popular

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* See photograph No. 45, p. 96b.

† See photograph No. 46, p. 96b.

with Russian pilots.[47] During the last two years of the war, Russian fighter planes were generally superior to those sent to them by their Western Allies under lend-lease, but they remained deficient in climbing power and maneuverability at higher altitudes and never overtook Germany's top fighters in diagonal diving speeds. Considering their fine handling qualities they were about equal to the German planes in the field in 1944. In fact, the Yak-3 was superior to German planes at low and medium altitudes. Few of these planes appeared on the front, however.[48]

Russian bombing missions were carried out by IL-4, "Mitchell" B-25, Douglas "Boston" A-20, and Pe-2 aircraft. These planes were maneuverable and well suited for medium bombing activities, but they were far too light for strategic purposes and therefore were used mainly for tactical purposes.[49]

The standard ground-attack plane for the Russian Air Force was the well-armored IL-2 "Stormovik," which was highly vulnerable to fighter attacks from the rear, although its armor protected it very well against ground fire. It might have been a more effective aircraft had not Soviet leaders persisted in doubling its payload of bombs so that its good flying characteristics were considerably diminished.[50]

The aircraft instruments used by the Russians, such as bombsights, radio direction-finding equipment, generators, and compasses, were as crude as their flares and ammunition, and most of them were obsolete. Even the American delivery of innumerable radio units and the American outfitting of meteorological stations failed to cause a sudden improvement in Russian communications. This was principally the result of a critical shortage of personnel capable of manning such stations and equipment. Control tower installations were unheard of in Soviet ground organizations and radio and electrical apparatus were usually nonexistent. When units took off it was reminiscent of the old flying squadrons of World War I, which operated from primitive flying fields and communicated by a wave of the hand or a tip of the wings. Even normal field telephone equipment was absent from most Soviet airfields.[51]

The best known large transmitting station was at Moscow. Russians continued to make broadcasts from this station long after it had been identified by the German Air Force, and kept it in operation until the latter part of the war. In the meantime it was used as an orientation point by German flyers.[52]

When Russian squadrons were finally outfitted with radios, they came under the control of air-direction teams. Air-to-air communications were notably absent in Russian units, but transmissions in the clear by air-direction teams were not necessarily helpful. Because of notoriously poor radio discipline among Russian air and air-direction units, the appearance of German fighters invariably caused a medley of communications, profuse with mutual recriminations. [53]

The inferiority of Russian armored equipment accounted for many of the Soviet Union's tank losses in 1941. Later that year, however, the T-34 came out, which worked well and became the workhorse of the Russian armored forces. This might have been a decisive weapon, but Soviet leaders never fully understood the use of massed armor, and were content to grind away at the German ground and air forces. [54]

Conduct of Soviet Ground Operations

As the war drew to a close it appeared that Russian leaders had mastered the planning and execution of large-scale operations, including decisive breakthroughs. This seemed especially apparent in Zhukov's operations. The German units at this time, however, were composed of men with little training and equipment, and were only 20 to 50 percent of their regular combat strength. The Germans were also critically short of tanks, lacking enough for minimum operations. Armored vehicles of the Wehrmacht carried only enough fuel for one attack and artillery batteries were so seriously limited that they were unable to provide adequate support for any undertaking. German divisions along the Vistula in 1944 held fronts of 30 to 40 miles in breadth, an area which could not be defended. The German Air Force was, by this time, so seriously weakened from attrition on all fronts that Russian commanders and even Soviet troops in the field began to ignore it.

No really daring breakthroughs were made by Soviet troops until midyear of 1944, and then only in places where they enjoyed great numerical superiorities. Breakthroughs were never undertaken until the Russian command could muster massive forces to feed through the rupture. As a rule Russian infantry did not exploit its gains after penetrating a defensive position, but awaited the transmission of new directives, during which time the German Army and Air Force were often able to prepare countermeasures. It is thus little wonder that Soviet war losses amounted to 10,000,000 while those of its enemies amounted to 4,000,000.

In many instances the Russians were too hasty in occupying the line of departure, a result of inflexibility in the higher commands and a lack of proper teamwork at lower levels. The German Air Force was thus able to take positive action against these troop concentrations. This mistake was made throughout the war, so that operations in East Prussia in 1945 were much like those in Russia in 1942.[55]

During the greater part of the war the Soviet command manifested a disdain for safety. This surrender to expediency at any cost helped them to stem the German tide in some instances, but their losses were heavy. In the early part of the war equipment was more highly prized than men, but after 1941 this situation changed.

Chapter 9

SUMMARY

The Soviet Union was badly surprised by the speed and power manifested by Germany in its "Blitzkrieg" defeat of Poland in 1939. As a result, the Russians immediately and furtively inaugurated a program for the modernization of their army and air force. Soviet fears and anxieties were demonstrated by their sudden seizure of a number of independent adjacent areas--Finland, the Baltic States, and portions of southeastern Europe--and by their efforts to remove and revamp the entire Soviet war industry. When the first units of the German Wehrmacht rolled across the Russian frontiers, the Soviets had already taken steps to improve their air and ground defenses.

Russia's early losses were enormous. In aircraft alone she lost more than 4,000 in the first week of the war. The carnage continued all through the late summer and autumn, raising the tolls of Russian prisoners and destroyed equipment to incredible figures. In late October Hitler mistakenly announced that the Soviet Union was in its "death throes." The arrival of an early and exceptionally cold winter soon brought the situation into better perspective. The Soviet Union had indeed suffered heavy losses, but these losses were not decisive. The reactions of Soviet air and ground units to German air attacks had made many of its enemy's victories costly and time consuming, and time was of the essence for the German Army and Air Force. Possessing a thorough knowledge of their home terrain and a mastery of the arts of camouflage, deception, and improvisation, Soviet troops were able to keep their own forces in the war and to have them at least partially intact for later offensives. The Germans, fighting in an environment about which they knew little, under conditions for which they were grossly unprepared, and against an enemy which they had seriously underrated, found themselves forced to adopt many of the Russian techniques for their own protection and survival.

Soviet leaders learned to compensate for their deficiencies by arranging their air and ground operations within a framework of conditions which tended to favor their comparatively untrained, but expanding, armed forces. Russian reactions to air attacks seemed to the Luftwaffe to be of minor importance when Wehrmacht offensives were in full swing, but as these drives bogged down, Russian measures could no longer be ignored, even on a local basis. With the lengthening

of the Russian campaign, German Air Force leaders grudgingly admitted that they faced an extremely clever, ruthless, and able opponent, who cunningly understood how to equalize his chances against an enemy possessing greater tactical and strategic sophistication. Many of the Russian reactions to German airpower were copied from German tactics, and were valuable in helping Soviet forces to nullify enemy air transport, combat, and even air defense operations. As a result, when the Russian ground forces went over to the offensive their advances were even more rapid than they would normally have been. The Luftwaffe then found itself caught up in a giant cause-and-effect circle. Offensives of the Red Army resulted in the conquest of scores of German air bases and forced German bomber squadrons still farther from vital strategic targets. At the same time, Soviet advances threw the German Army into a series of critical situations requiring immediate air support, which tied the German Air Force even more closely to ground operations and tactical problems and hampered any serious strategic efforts. Yet even those support operations were unsatisfactory in many cases because of heavy personnel and equipment losses within the Luftwaffe.

Since neither the Russian Army nor Air Force had been decisively defeated in the field, both were able to regain the initiative, and even relatively weak Russian air organizations continued to affect German operations in the East. Russian air units supplied partisans, coordinated Red Army operations, and, when conditions permitted, harassed the Luftwaffe. It would, however, be a grave mistake to assume that the defeat of the German armed forces was largely a result of Soviet airpower, since World War II was a period in which the Russians were just awakening to a realization of the potentialities of airpower. Even the Germans were principally concerned with the operations of armies and army groups on the battlefield, where the major decisions were unfolding. The Russian Air Force was, nevertheless, a factor which materially contributed to stem the tide of battle and start Germany on its road to defeat.

It should be borne in mind that many Soviet operations were timed to coincide with the blows landed by the Allies in the West and in the Mediterranean area. The three-front war could only have the effect of dissipating the German armed forces. Despite the pressing need for air support by army units on the Eastern Front, the Luftwaffe, after 1942, was even more urgently required for the defense of the homeland against the massive airpower of

Great Britain and the United States. Having failed to stifle the influx of lend-lease equipment into the Soviet Union or to destroy the Russian war industry (especially the aircraft industry), the Luftwaffe was obliged to face more formidable odds as the war progressed, unfortunately at the precise time when Germany's demands for air defense became most critical.

These factors combined to thin out and eventually nullify the best efforts of the German Air Force. During the latter stages of the war its operations were sporadic in character and extremely temporary in effect. The Luftwaffe, harassed on three fronts and over the Reich, almost isolated from its sources of petroleum--with the exception of the heavily damaged synthetic industry--short of aircraft, and suffering grievous personnel losses, was compelled to commit its remaining flyers in hundreds of futile air defense actions against enemies with overwhelming numerical superiorities. It thereby lost its only available group of capable pilots, many of whom had, until then, survived the war from its inception in 1939.

Because of Soviet camouflage, deception, and improvisation the German Air Force was unable to stop the steady flow of arms and equipment to the Russian forces at the front, the infiltration of Russian troop units into German occupied areas, and the menace of partisan activity. Active and passive Soviet defense measures prevented Luftwaffe units from accomplishing needed logistical support of entrapped German units and increased the steady rate of attrition within the German Air Force. The success of Russian reactions is attested by the German employment of fighter cover for all bombing, dive-bombing, "destroyer," and airlift operations, in the call up of reservists and instructor personnel to fill the gaps in the Luftwaffe in the East, in the increasingly urgent demands for fighters at the front to counter Russian actions, and, finally, in the transition of the German Air Force to an almost purely defensive arm as the Soviet Air Force achieved air superiority.

As events show, Russian reactions to German Air Force operations, however primitive and makeshift in character, and however crude they might have first appeared to be to their more enlightened Western opponents, proved throughout the course of the war to be highly efficient, effective, and ultimately an important factor in the defeat of Germany.

FOOTNOTES

Chapter 1

1. United States Department of the Army, OCMH, Russian Combat Methods in World War II, DA Pam. No. 20-230, EUCOM, Hist. Div., 1950, p. 4. Cited hereafter as DA Pam. 20-230.

2. General der Infanterie Guenther Blumentritt, "Evaluation of the Armies of 1914-18 and 1939-45," MS #B-293, Washington: OCMH, EUCOM Hist. Div., 1946, p. 14. Cited hereafter as Blumentritt, "Evaluation."

3. General der Flieger (Ret.) Karl Drum, Airpower and Russian Partisan Warfare, USAF Historical Studies No. 177, Maxwell AFB: USAF Hist. Div., RSI, March 1962, pp. 31-32. Cited hereafter as USAF Study 177. This source quotes Gerhart Weinberg, The Role of Airpower, p. 30. See also Generalmajor Hellmuth Reinhardt (Ret.), "Russische Luftlandeoperationen," ("Russian Glider Operations"), Part I, pp. 50-51, G/VI/2c, Karlsruhe Document Collection.

4. Generaloberst (Ret.) Heinz Guderian, Erinnerungen eines Soldaten (Recollections of a Soldier, appearing in an American version as Panzer Leader), Heidelberg: Kurt Vowinckel Verlag, 1951, p. 145. Cited hereafter as Guderian, Recollections.

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51. Rudel, ibid., p. 59.

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1. Observations No. 20.

2. Uebe Commentaries. See also Improvisations and Inventiveness.

3. Observations No. 20.

4. Letter from Maj. (Ret.) G. Jakob to Generalleutnant (Ret.) Klaus Uebe, dated 28 February 1954. Cited hereafter as Jakob Letter.

5. Rudel, Nevertheless, p. 192.

6. Ibid., p. 192. See also Uebe Commentaries.

7. Employment of Water Balloons.

8. Deichmann Paper. See also Generalleutnant (Ret.) Hermann Plocher, "Abschnuerung des Schlachtfeldes von und waehrend der Kesselschlacht von Kiew, 1.9. - 25.9. 1941," ("Isolation of the Battlefield Before and During the Battle of Encirclement of Kiev, 1 September - 25 September 1941"), Studie Russland Feldzug (Study, Russian Campaign), Zweites Buch, Anlagen Band 2c, Karlsruhe Document Collection. See also Nielsen Paper.

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10. Observations No. 20.

11. Ibid. See also Uebe Commentaries.

12. Improvisations and Inventiveness.

13. Jaehne Report. See also Improvisations and Inventiveness.

14. Hornig Interrogation. See also PeKrun Interview.

15. Jaehne Report. See also Improvisations and Inventiveness, pp. 23-27.

16. Nielsen Paper.

17. Deichmann Interrogation. Uebe Commentaries.

18. Uebe Commentaries.

19. Improvisations and Inventiveness. See also Uebe Commentaries. See also Jaehne Report.

20. Deichmann Paper.

21. Improvisations and Inventiveness.

22. Jaehne Report. See also Improvisations and Inventiveness.

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1. Piper Report.

2. Ibid.

3. Von Riesen Paper.

4. Pabst Diary. See also Hornig Interrogation.

5. Hornig Interrogation.

6. Uebe Commentaries.

7. Hornig Interrogation.

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12. Pabst Diary. See also Blasig Treatise.

13. Rudel, Nevertheless, p. 39.

14. Pabst Diary.

15. Ibid. See also Uebe Commentaries.

16. Trautloft, Experiences.

17. Hornig Interrogation.

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24. Blasig Treatise.

25. Trautloft, Experiences. See also Hornig Interrogation.

26. Mahlke Report. See also Uebe Commentaries.

27. OKL, Anti-tank Air Squadrons.

28. Combating Armor.

29. Pekrun Interview. See also Hornig Interrogation.

30. Mahlke Report. See also Uebe Commentaries.

31. Improvisations and Inventiveness.

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42. Hornig Interrogation.

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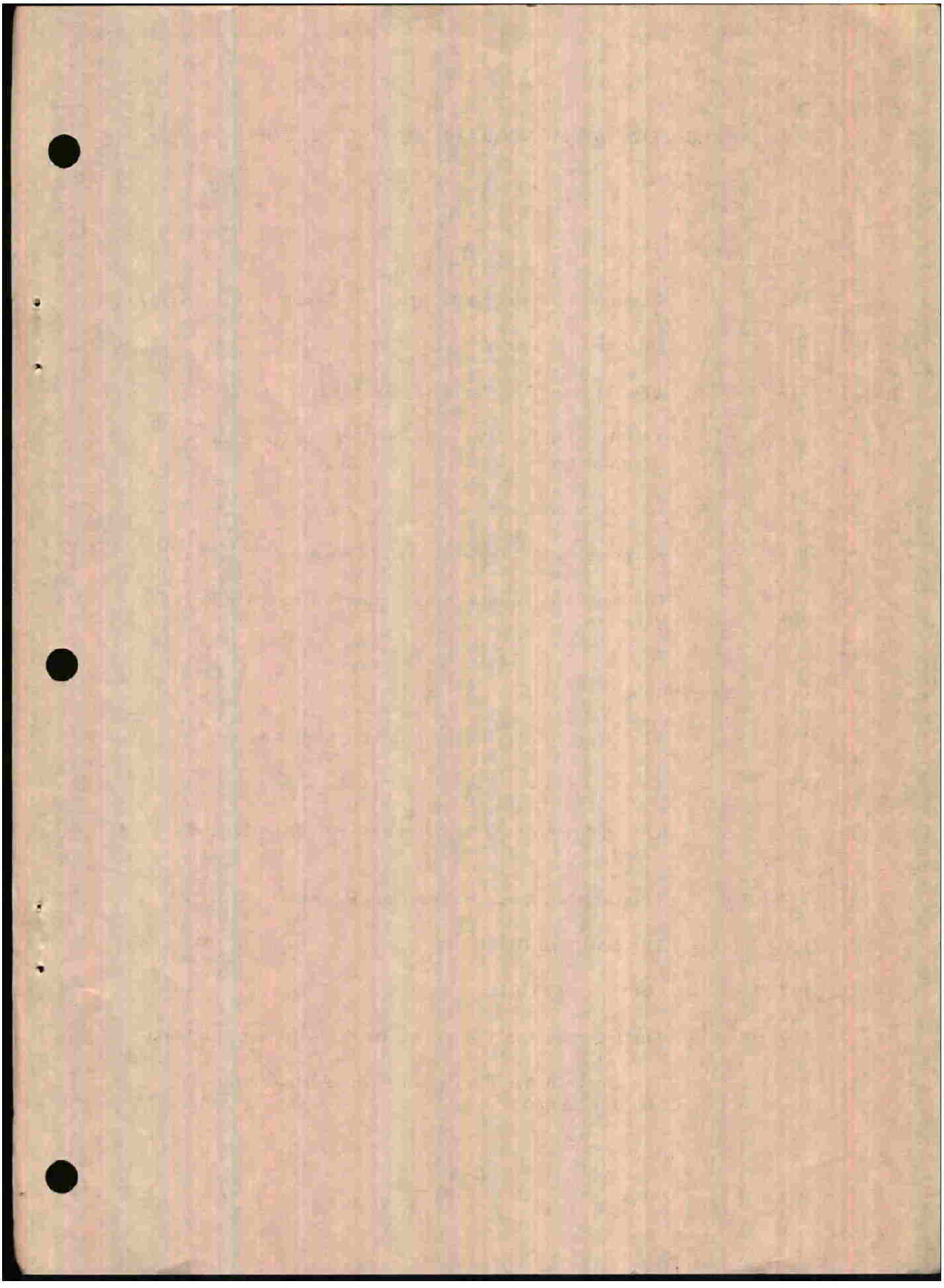

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